

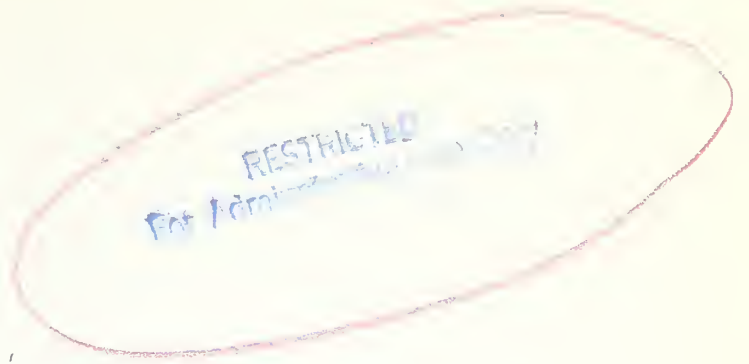
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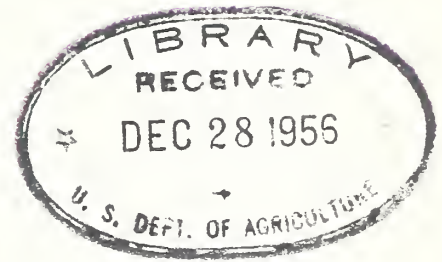


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FIELD EXAMINATION REPORT



BIRCH CREEK WATERSHED

UMATILLA COUNTY

OREGON

DECEMBER 1955



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# BIRCH CREEK WATERSHED

## Field Examination Report

### INTRODUCTION

This watershed is located mostly in southwestern Umatilla County with a small area in Union County.

This report has been prepared to supplement and complement the information made available in the application of the sponsoring groups. It is intended to furnish a background for determining watershed project feasibility and for approval or disapproval of the application by the State Engineer of Oregon and the State Conservationist of the Soil Conservation Service.

Much interest in correcting the conservation problems of this watershed has been voiced by many groups in or near this area; namely, the Southern Umatilla Soil Conservation District, the Pilot Rock Farm Bureau Center, the Pilot Rock Kiwanis Club, the Pilot Rock Chamber of Commerce, and the Pilot Rock Lumber Company, all of which have signed the application, either as sponsor or as a supporting group, for assistance under the Watershed Protection and Flood Prevention Act, Public Law 566, as passed by the 83rd Congress.

The principal interest of the farmers, ranchers, municipal and the industrial firm is the need for storage of water for flood protection, irrigation and industrial water supply. No storage reservoirs for these purposes now exist in the watershed.

The watersheds' total acreage amounts to approximately 186,000 acres which are divided as follows:

Valley floor (mostly cultivated)	6,000 acres
Upland terrace " "	60,000 "
Rangeland	80,000 "
Forest lands	40,000 "
	<hr/>
	186,000 acres

The following organizations assisted in the Field Examination: Southern Umatilla Soil Conservation District, State Engineer's Office, State Game Commission, State Extension Service, State Board of Forestry, State Fish Commission, Corps of Engineers, U. S. Bureau of Land Management, U. S. Bureau of Indian Affairs, U. S. Forest Service, U. S. Bureau of Reclamation, and the Soil Conservation Service.





This watershed application was submitted to the State Engineer, who has been delegated by the Governor of Oregon to handle such matters. He approved the application and forwarded it to the State Conservationist of the Soil Conservation Service.

## WATERSHED CHARACTERISTICS

### TOPOGRAPHY

Birch Creek drains north from the main ridge of the Blue Mountains to its confluence with the Umatilla River. The general watershed aspect thus is northerly,

Elevations range from just under 1,000 feet at the mouth of Birch Creek to just over 5,000 on the southern rim of the watershed. Average slope from rim to mouth over a 28-mile distance is approximately 3 per cent. Actually, the watershed is divided into two distinct parts. The northern lower-half is at low elevation and fairly flat. The southern upper-half consists of sharply dissected steep ridges and canyon country.

About eighteen miles above the mouth, the stream channel and the associated watershed lands begin to rise quite steeply. This rise is the edge of the old plateau which forms the Blue Mountains. The flat-to-rounded ridgetops and the rounded contours of the steep sideslopes at the upper end are typical. Somewhat lower, the topography is bench and rimrock on the newer volcanic formations.

The lowest part of the area has hilly to gently rolling topography, on windborne sediments overlying basalt. In a few places there are remnants of old river terraces and lakebeds. The channels are less deeply incised and the valleys are wider.

### SOILS AND GEOLOGY

The upper watershed is composed of a mixture of Miocene and later volcanic rocks with a ban of pre-Miocene metamorphic rocks. At middle and lower elevations the predominant rock formation is the Columbia lava. There are in the foothill and mountain areas small patches of volcanic ash and a few beds of old lake deposits. Across East Birch Creek, below the junction with Pearson Creek, there is an area of rhyolite associated with stratified sands and silts. Scattered patches of granitic rocks (largely diorites) occur in the headwaters of Birch, Bear, Bridge, and West Birch Creeks.

Soils are derived from variable parent materials including loess, alluvium, and various kinds of rock such as basalt, granite and metamorphic. The loess or windlaid soils are of mixed origin



having as their source several kinds of rock materials. These soils are principally the Ritzville soil series developed on deep loess, and the Pilot Rock soil series developed from a thin mantle of loess over a deep deposit of waterlaid gravelly materials. Soils of the higher elevation are relatively shallow to rock largely basalt. The deeper soils are of the Waha and Morrow soil series. Alluvial soils of the bottomlands adjacent to the creeks are of recent deposit and somewhat older pans and terraces. The soils include the snow and onyx soil series with a few small areas of Stanfield and Hermiston soils. Pockets of volcanic ash occur throughout the area.

Cultivated areas of the terraces and lower hills are sandy loams, and silt loams of the Pilot Rock and Ritzville soil series. They are used for growing wheat. The foothill areas, where the slopes are grazed and the ridgetops are cultivated, have shallower and stonier soils. Silt loams and silty clay loam types of several soil series are represented.

The higher foothills and mountain areas are covered with very stony silt loam to silty clay loam soils of the Waha, Underwood, and related soil series.

In places along the valleys there are patches of saline soils that present a problem. The areas of volcanic ash generally are infertile and highly erodible, presenting another problem. Most of the soils are quite fertile, however, and will support such crops as climate will permit.

#### CLIMATE

The climatic factor of precipitation is the one of greatest importance. However, temperature and wind movement can be significant when snow accumulation and melt are considered.

Average annual precipitation ranges from about 12 inches at the lower end of the watershed to 32 inches at the upper. Most of the precipitation on the watershed occurs in the fall, winter, and spring seasons. On the average, two-thirds of the total occurs in the six months - November to April. On the upper watershed, much of the precipitation is snow.

Floods result from rapid snow-melt, usually in May, but sometimes in January and February thaw periods, and from heavy rainfall. Spring rains may be relatively heavy, and limited area cloudbursts are fairly common. Rainfall intensities are high, as much as 1 1/2 inches in 20 minutes have been reported in the general area.



## FLOOD CAUSES

Floods are the result of runoff that cannot be absorbed and held back by the soils on the watershed. Runoff rates may be high for climatic reasons - either high intensity or rapid snow-melt from warm winds - or because of soil conditions. The Birch Creek Watershed, to a large extent, is covered by shallow, stony, heavy-textured soils that do not have much moisture storage capacity. Further, the infiltration capacity or moisture acceptance of these soils has been decreased by compaction over large areas.

More recently, growing big game herds restricted in their range by cultivation and fencing in the lowlands, have added to the problem, though most of the domestic stock are now off the upper ranges. Floods begin with runoff from the bare, compacted, tight, clay subsoil which is all that is left on the highest ridges.

Erosion is severe on many scab ridges and side slopes, though in most of the grazing areas less now than formerly. The majority of the soil has long since gone. On previously untouched areas, logging operations in some areas are creating a new erosion hazard. Logging skidtrails have become gullies, and are contributing quantities of sediment and debris to stream channels below.

## LAND USE

### Land Use of Valley Lands

Approximately 6,000 acres of cultivated land lie within the valley area of Birch Creek, of which 4,000 acres are along the main stem below Pilot Rock and the remainder (2,000 acres) is along the upper tributaries. About 4,000 acres are devoted primarily to the production of irrigated hay and pasture. Irrigation water is in short supply during the late growing season on 80% of the irrigated land. This shortage of water reduces production to about two-thirds of its seasonal potential. About 500 acres receive full season irrigation where water is available from wells. An additional 300 acres are irrigated only during very favorable water years and are otherwise dry farmed. About 1,500 acres of the valley lands are devoted primarily to dry land grain production. Small areas are used as dryland pasture and miscellaneous uses.

### Land Use of Uplands in the Lower Watershed

The condition of pasture is generally poor. This area of lower watershed upland lies generally below an elevation of 2,500 feet and comprises about 60,000 acres. About 70% is used to produce grain under a summer fallow system of farming. About 20% of the



area is in range which is pastured in the fall along with grain stubble during alternate years. Most of this range is in fair condition. The remaining 10% is used as pasture and feed lot areas mostly adjacent to farm and ranch headquarters.

### Range Lands

The open grass range occupies an area of approximately 80,000 acres of steep to moderately steep foothill. It is generally about the 3,500 foot level and below the forested lands in the upper watershed. Fingers of forested lands extend down into the upper range area along the tributary drainages. The condition of the range is generally fair. Areas of both good and poor condition range also exist.

### Forested Land

The forested land occupies an area of approximately 40,000 acres, of which about 50% is in the Umatilla National Forest. Most of the remaining forest is in private ownership. All of the forest land is grazed by domestic livestock, and as well, supports deer and elk.

### WATER SUPPLIES

The primary source of irrigation water is from stream flow as a result of snow melt. A small supply continues during later summer and fall from springs in the upper watershed. Only a few irrigation wells (8 wells) have been developed and are used to irrigate a limited acreage. The city of Pilot Rock and the Pilot Rock Lumber Mill secure their water supply from wells. There is concern over the apparent depletion of underground water as a result of present limited developments.

It is estimated that the total average yield of water from the watershed is somewhat over 30,000 acre feet annually. Probably less than 20% is usable for irrigation, the larger portion leaving the watershed at a time when it is in flood stage or during off season runoff periods.

### OWNERSHIP AND TENURE

With the exception of approximately 20,000 acres of National Forest, 700 acres of Indian Reservation land, 600 acres of Bureau of Land Management, and small areas of city and industrial sites, the watershed is in private ownership.

There are 80 farm and ranch operating units within the watershed. Most of the land is privately owned and operated. Some land





is also owned by farm and ranch operators whose base operations are outside the watershed boundary.

### WATERSHED PROBLEMS

#### FLOODWATER AND SEDIMENT DAMAGE

Ordinary floods in Birch Creek occur annually in the late winter or spring months, due to melting snow in the upper portions of the watershed. It is possible to receive rains during the period of snow melting that could cause damaging floods.

The greatest potential for major floods in this drainage area occurs during spring and summer months and results from intensive rain fall lasting for short periods, one hour or less.

The flood problem area extends from the mouth of Birch Creek, which junctions with the Umatilla River a short distance below Reith, Oregon, upstream approximately 14 miles to the vicinity of Pilot Rock, Oregon. The city of Pilot Rock and the Pilot Rock Lumber Company are within the flood plain. Also, farm lands along the West branch of Birch Creek for some 10 miles and along the East bank for 8 miles, all above Pilot Rock, are within the flood plain. The valley floor has an average width of about 1,500 feet; with a maximum width of 3,000 feet narrowing to 400 feet or less at several locations. A large portion of the valley flood plain is irrigated by diversion from stream flows.

Agricultural lands, a part of the town of Pilot Rock, sections of the Union Pacific Railroad branch line, and U. S. Highway 395 have suffered from past floods.

The East and West forks of Birch Creek junction at the lower edge of the town of Pilot Rock, and have caused considerable flood damages to this town. The flood plain for a major flood includes the business district and several residential blocks. Some structures encroach upon the channel capacity and near Willow Street a portion of the creek channel passes beneath a building supported by piers.

Just below Pilot Rock, a large saw mill and fiber board plant, two mill ponds and large storage yards are within a moderate flood plain. The Union Pacific Railroad branch line from Reith crosses the flood plain seven times from Reith to Pilot Rock.

The flood of June 22, 1938 caused the most damage of any of the recent floods on Birch Creek. Two other floods occurred in 1903 and 1912 which are reported to have been of similar magnitude to the 1938 flood.



The 1938 flood was estimated to have covered about 900 acres of land and caused considerable damages in Pilot Rock and below Pilot Rock.

Due to a large increase in the business section of Pilot Rock and major construction and improvements at the lumber mill and fiber board plant a similiar present day flood might be expected to cause damage throughout the flood plain in excess of \$1,500,000.

Flood flows cause the movement of some sediment, which has a damaging effect on lands that are overflowed and also destroys the effectiveness of the irrigation canals.

The streambed load of sands, gravels and boulders that are carried down do much damage to channel capacity of the stream, and also in many cases obstruct inlets to the irrigation canals.

There is no record of any loss of human life caused by floods in Birch Creek. A small number of livestock have been lost, and farm bridges, diversion dams, fences and other structural improvements have been lost from floods in the past.

Severe floods may affect the fish populations detrimentally in two ways: (1) They may cause sudden changes in the stream channel that may isolate productive sections of the stream, resulting in loss of live fish, spawn, and stabilized rearing areas that are far more productive than raw channels devoid of fish food organisms. (2) Deposition of silt from floods may result in the loss of fish spawn, and of fish food organisms which are covered up and suffocated. However, freshet flows in the spring of the year are essential for the survival of the steelhead populations since these high flows provide the necessary conditions for the migration and spawning of the steelhead. It is important that provisions be made for adequate flows below all impoundments throughout the year to provide adequate water for the spawning of the adult steelhead and the rearing of the young. Failure to provide such flows would result in the impairment of the runs of anadromous fish as has occurred in numerous places in connection with irrigation projects.

## EROSION DAMAGE

### Stream Channel Erosion

Stream channel erosion and bank cutting is the most critical erosion problem of the watershed. Stream erosion in the upper watershed is such that it has been classified as a high silt contributing area. Bank cutting along the main channel in the lower valley is taking its toll of good cropland each year. A good deal of money has been spent along sections of the lower channel in at-



tempts to protect good cropland from bank erosion.

### Erosion on Grainland

Most of the erosion on grainland is caused from flash rains which do not occur regularly. Erosion on the grainland is generally classified as slight sheet erosion. Steeper lands show evidence of moderate sheet and gully erosion. Gully erosion is also in evidence along drainage ways originating within the grain producing area. The bottoms on many of the drainage ways are stabilized by natural rock with some side cutting occurring.

### Erosion on Range and Forested Lands

Generally, erosion on range land is not a big problem. There are areas, however, that have suffered severe erosion losses and others that are subject to continued serious erosion losses. These may be described as follows:

1. Areas along stock driveways
2. Heavily used areas around winter headquarters and where livestock are grazed yearlong.
3. Concentration areas around water, salt, etc.
4. All areas where range is in poor condition.

It is estimated that 20,000 acres of range are subject to erosion damage due to the poor condition of the plant cover.

Indicators of soil conditions and land abuse conducive to erosion are found in the numerous "cow-contours" that crisscross the hillside ranges below the forest. Here and there on the slopes are patches known as "blowouts", where all the soil is gone over small areas. The stream channels, too, give evidence of continuing erosion activity. Stream banks appear freshly undercut along many reaches, and the channels are clogged with sand and gravel.

The channel conditions cited continue up into the forest. There they are aggravated by gully erosion in abandoned logging skidtrails and by sheet erosion on the ridgetop stock driveways. The practice in logging of yarding logs down the channels has increased the amount of disturbance. Within the national forest area, where there has so far been no logging, the channels appear fairly clean and stable.

Scabby ridgetop areas of the stock driveway are still used by four bands of sheep each year. This is much lighter use than formerly, but still sufficient to keep the soil compacted and the cover from regenerating. Heavy runoff from the driveway has cut gullies in good meadows below.



## WATER USE AND MANAGEMENT PROBLEMS

At the present time the unregulated flow of Birch Creek is used for irrigation. Those who own land adjacent to the stream have irrigation canals constructed to convey water to their farms. Many of the diversions only serve one operator. Early spring flow is adequate, however, the normal mid-summer discharge of the stream is far from adequate to irrigate the available farm land. There is definite need for irrigation storage to provide water for July, August, and September.

Storage facilities that would provide 8,000 to 10,000 acre feet are needed for agricultural purposes. The lumber mill at Pilot Rock is operating the plant from Birch Creek water and 2 wells. The past three years of operation have reduced the static level of these wells some 20 feet. The owners of the mill feel that they will have to have supplemental storage within a few years to operate the plant. The needs for the mill are estimated at 1,000 acre feet annually.

The town of Pilot Rock has a well which produced 1,400 gallons per minute ten years ago. Now it is not producing in excess of 600 gallons. The town has more than doubled in population during the past 10 years.

There would be considerable advantage to fish and wildlife if a year around flow was available in both forks of the Creek. At present the movement of fish is hindered in late summer.

Some pollution problems exist in the main stream since the town of Pilot Rock does not have a city sewer system.

At the present time only minor drainage problems exist within the drainage areas.

Birch Creek is an important producer of steelhead trout within the Umatilla River system with annual escapements to the spawning areas of an estimated 500 - 1,000 adult fish.

The young steelhead and trout are affected by the low flows of the stream during the summer and fall months. Low flows reduce the productivity of the streams both in numbers of young fish produced and the food organisms upon which these fish feed. Proper management of the headwater watershed, where the forest cover directly affects the ground runoff, is essential in order to maintain flows during the critical low flow periods. Pollution emanating from the town of Pilot Rock forms a hazard to the young fish as they migrate through the lower reach of Birch Creek.

As a result of the various factors affecting the survival and





successful propagation of the fish populations, the present production of the Birch Creek system is definitely below the optimum. Intelligent management of the watershed with attention directed at the fish problems could increase the fish yield of the watershed considerably.

To date nearly all small irrigation dams have been adequately laddered to provide upstream access for steelhead. In 1947 and 1948, twenty rotary-type screens were installed in concrete boxes on diversions leading from Birch Creek. Sixteen are located on the East Fork of Birch Creek and ten on the West Fork. Of the total, about twelve are in operation and are maintained throughout the early spring and summer months by Oregon Game Commission personnel.

The Birch Creek Watershed is also of major importance to game management. It is an important wintering area for both deer and elk, and has a good summer deer population. The higher elevations are also used to some extent as a summer elk range. Other game using this area include both blue and ruffed grouse, Chukar partridges, Hungarian partridges, pheasants and quail.

The watercourse proper is used to some extent by waterfowl, and by mink, muskrats, and beaver. During the hunting seasons, upper forks are heavily hunted for both deer and elk; lower Birch affords some of the best upland-game hunting, and duck hunting in this district. Adjacent grain fields offer good goose hunting.

## PROJECT OBJECTIVES

### LAND TREATMENT ON PRIVATE LAND

#### Treatment on Dry Farmed Grainland

Most of the erosion on grainland can be adequately controlled by the use of simple conservation practices, namely; operations across the slope, cloddy tillage and the return of stubble and crop residues to the soil. Mulch tillage is also needed on slopes where moderate sheet and gully erosion is occurring. On long slopes and where steep break diversions are also needed. Strip cropping as an alternate or addition to mulch tillage may also apply on the more erosive slopes. Vegetative waterways are needed to safely dispose of runoff water throughout the grain area where protected outlets do not exist.



### Treatment on Range Lands

- A. Grass management practices
  - 1. Rotated deferred grazing system
  - 2. Safe degree of use
  - 3. Proper season of use
  - 4. Observing range readiness
- B. Stock management practices
  - 1. Fencing
  - 2. Water development
  - 3. Salt away from water
- C. Special practices
  - 1. Reseeding where needed and feasible
  - 2. Spray for fly control
  - 3. Trail building

### Treatment of Irrigated Lands

- A. Improved land preparation
- B. Revise irrigation systems and methods
- C. Improved water application
- D. Reseeding to improve hay and pasture stands
- E. Rotated grazing on irrigated pasture
- F. Fertilization to improve forage production

### Practices and Progress

Fire protection is about the only measure currently applied that is of help to watershed protection on forested lands. Grazing of cattle on forest fringes appears extensive. Logging practices in many instances appear harmful to watershed values.

Improvements in planning and management of both grazing and logging operations are necessary, and could be gained at little extra cost by the use of technical assistance. Some stream channel clearing and bank protection works may be needed in the upper reaches of the tributaries.

Some improvement in fire protection might be provided by additional air patrol during periods of high hazard.

Twenty-two farm and ranch operators have signed cooperative agreements with the Southern Umatilla Soil Conservation District. They are in the process of developing conservation plans for their lands. The lands they operate includes approximately 20% of the



private land in the watershed. Conservation farm planning can be accelerated as needed to meet the requirements of the watershed program.

#### LAND TREATMENT ON PUBLIC LAND

Elimination of all grazing by domestic stock on critical areas, reduction of big game herds, and reseeding on the scab ridges are the measures primarily needed. About 1,000 acres need treatment on national forest lands, to include cultivation, seeding, and fertilization with ammonium sulfate. Some 16 miles of three-strand fence will be required to protect the reseeded areas.

Contour trenching will be needed on some sidehills. A more complete survey is necessary to determine total needs.

Game herd control by increased hunting needs to be worked out with the State. There are too many elk and deer for the depleted ranges to support.

More intensive air patrol is needed for periods of high fire hazard to improve fire detection. Establishment of additional lookouts is not advantageous because of the topography.

Diversion from the tributaries that will intercept floodwaters and spread them on dry meadows would be useful, both to improve forage growth and to reduce flood damages downstream.

Fire protection and a small amount of range reseeding are the only activities at present of interest to watershed management. About 20 acres of reseeding per year are currently being accomplished on the scab ridge areas.

Continuation of fire protection, providing for satisfactory logging methods when the timber is harvested, reduction of live-stock grazing, arrangements for control of big game herds, and continuation of reseeding operations are all included in present plans of the Umatilla National Forest. Plans for fire protection and timber harvest management appear adequate for watershed protection under present conditions.

There would be no conflict with local interests in getting the needed conservation measures established on public lands. Local interests are aware of national forest problems and are sympathetic.



## FLOOD PREVENTION STRUCTURAL MEASURES

Very little structural work has been installed to date for flood protection within the watershed. The state highway department has built a new bridge across east Birch Creek within the city limits of Pilot Rock which has adequate capacity. The Pilot Rock Lumber Company has changed the alignment of the Creek and installed some bank protection along the mill ponds within their property.

Individual ranchers have performed limited maintenance work on the creek channels within the limits of their properties. However, no planned program of operations have been made for all of the stream. All of the work to date has been planned and financed on an individual basis. Some of the most critical locations have not had adequate treatment.

To satisfy the overall needs of the watershed consideration will need to be given to both storage of water for late season irrigation, flood prevention and channel rectification to pass flash floods.

It would be desirable to have storage on East Birch Creek and on the West Branch of Birch Creek. The field examination inspection did not reveal any dam sites on either Creek that might provide cheap water storage. One site in section 16, T-2-S, R-33-E W.M. should be considered on the east fork of Birch Creek. Likewise, a site located in Section 31, T-2-S, R-32-E W.M. should be considered on the west branch of Birch Creek. If these sites have possibilities for economical storage of water, they would have to be considered primarily as irrigation structures although some flood benefits would result from the storage of early spring runoff.

However, there is need for improvement to the channels to provide safe passage of flood flows that might result from spring and summer storms. These peak flows may be expected to reach a magnitude of 6,000 c.f.s. This is based on the supposition that the same storm conditions would occur in the whole upper watershed concurrently. The most critical channel conditions exists on the two branches of the stream through the town of Pilot Rock, and immediately below their junction, adjacent to the Pilot Rock Lumber Mill property. This section needs more channel capacity, improved alignment, removal of trees, brush, foot bridges and other obstructions.

The aforementioned improvements and structures appear to merit further study and examination. Materials and rights-of-way may present some difficult problems; however, through coordinated effort it does not appear that any of the obstacles can not be overcome.





The proposed reservoir storage suggested within the watershed cannot be considered as major flood control structures. To keep overall storage costs to a minimum it will be necessary to attempt to find storage sites upstream where cultivated lands and farm buildings are not involved within the storage basins. Reservoirs at these locations, no doubt, will be too high up in the watershed to give maximum protection from spring and summer floods, to the town of Pilot Rock, and other critical down stream areas. Some benefits will be available from damages that may be expected from peak flows that occur during the early spring runoff from the high areas in the watershed. Also, limited benefits could result from these structures, operating at peak or near peak capacity during the spring and summer months. Large flows resulting from summer storms routed through these structures would be retarded to a degree and would produce some benefits. There is need for additional irrigation diversion structures, located throughout the length of the creek. Construction of these structures will have dual benefits, primarily diversion of stream flow for irrigation, and secondarily, channel and streambed stabilization.

Bank protection at critical erosion points would eliminate loss of valuable lands, and also decrease the amount of bed load and debris carried by the stream during flood peaks.

#### IRRIGATION MEASURES

Present irrigation developments in the Birch Creek Watershed do not include major structures or systems. Farm lands are located adjacent to the stream throughout some 30 miles of its length and vary in width from one or two hundred feet up to one half mile. The stream gradient is quite steep, and the land ownerships for the most part are large. Therefore, the majority of the ranches have individual diversions and ditch systems for their ranches. There are about five or six permanent concrete diversion structures within the area. Many more are needed. No storage exists to furnish late season water for irrigation. At present the natural flow of the creek does not normally provide adequate irrigation after the first of July. A few of the lands that have the earlier water rights may benefit for a short time after this date. Construction costs and maintenance costs are for the most part on an individual ranch basis.

Present method of irrigation is primarily by flood methods. Perhaps 25% of the lands are irrigated by sprinklers. There are 8 irrigation wells in the area and the owners use the water from these wells to operate sprinkler systems.



There are approximately 4,000 acres of land that is under irrigation. A good portion of the lands that are not irrigated by sprinklers would benefit from land leveling. Some of these lands are quite flat and could be irrigated by borders, after necessary grading operations were completed.

Some of the ranchers have started a land leveling program and are installing irrigation systems according to plans developed through the local Southern Umatilla Soil Conservation District. The district has been in operation only two years so only very limited operations have been completed to date.

It is anticipated that this phase of the program will progress with monetary help from the Agricultural Conservation Program and technical help through the local Soil Conservation District.

If storage sites could be developed to supply 2 to 2 1/2 acre feet of supplemental water for all of the lands now irrigated production and farm income would be materially increased. The needed land preparation and irrigation system improvement would, no doubt, be established at a satisfactory rate as additional water was made available. The normal average annual yield of the watershed amounts to about 30,000 acre feet. The extreme low exceeds 10,000 acre feet, which would be nearly adequate to supply the water needs of the area. As needed improvements were made to the irrigation systems and leveling programs were completed, more efficient use of the water would result.

There is only a very limited amount of new lands that might economically be irrigated if additional water was made available.

#### DRAINAGE MEASURES

Only minor drainage problems exist within the drainage area at the present time.

This condition may partly be attributed to the fact that there is a definite shortage of late season water for irrigation. On the other hand, the major portion of the lands that are irrigated have soils that have good drainage.

It is not expected that serious drainage problems would develop if adequate irrigation water was made available for all the land.

#### UNDERGROUND WATER BASINS

There are no existing measures in operation for the purpose of



recharging underground aquifers. The existing wells exceed 300 feet in depth, and it is very questionable if economical procedures could be set up that would add large amounts of water to the substrate.

#### MUNICIPAL WATER

The town of Pilot Rock depends upon wells for their water supply at the present time. The capacity of the present well appears to have declined in recent years until it now has about one-half of its original production. The population of the town has more than doubled within the past 10 years. The town officials feel that additional water will be provided from an additional well, when needed. Little thought has been given to supplying municipal water from a reservoir. There is a possibility that more interest will be developed in this direction.

#### FISH AND WILDLIFE HABITAT AND VALUES

Any proposed dam within this watershed in areas available to steelhead trout (anadromous salmonoids) would affect the natural propagation of this highly desirable species. If such structures could be provided with adequate fish protective devices, and if adequate flows were provided below the dams, any harmful effects would be eliminated or greatly reduced. Dams constructed in the headwaters above the routes of migration and utilization of steelhead would not require fishways and screens, but each project would require individual attention to the fish problems.

These man-made impoundments could conceivably be of benefit to anadromous salmonoids if they would provide: (1) adequate flows during the steelhead spawning season in the spring, (2) increased stream flows during the low flow period, thereby increasing the fish and food production capacities, (3) reduce water temperatures downstream and thus increase the rearing range of the fish (salmonoids require cool water for optimum production), (4) provide suitable rearing areas within the impoundments if provided with fish facilities such as ladders and screens, and (5) reduce stream pollution by dilution in the lower section of Birch Creek.

Flood control provisions such as revetments and channelization generally are detrimental to fishlife when carried out in the areas utilized for spawning and rearing. However, they may cause little or no damage when undertaken in the lower reaches of streams where velocities are low.

Impoundments on the upper reaches would probably inundate some of the upland game habitat, but would probably form usable waterfowl resting/nesting areas. Lower damming would remove some



upland game bottom-land cover, but would be desirable from a waterfowl standpoint.

Impounding sections of this stream would have little effect on big game, but might result in a conflict with burrowing fur-bearing animals. Both beaver and muskrats tend to burrow in earthfill-type dams and ditches.

#### RECREATIONAL FACILITIES

Storage reservoirs, if provided with minimum pools, can, and have, become excellent trout producers. If storage reservoirs are to be located where steelhead are not present, they may be of great value for recreation. Basic requirements for reservoir development by the Oregon Game Commission are as follows:

1. The impoundment must have an adequate winter pool to support fish life.
2. The area must be available to the public.

There are no public camping facilities in the watershed. Campground with water, toilet and garbage facilities will be needed to meet increased hunter use of the area under proposed game management. The only present recreation use in the watershed is by hunters and fishermen.

#### WATER RIGHTS

The main sources of supply for irrigation are from the natural flow of Birch Creek and its tributaries and, to a limited extent, from wells.

Table A sets out the area under Birch Creek and its tributaries which have adjudicated rights and rights covered by permits issued by the State Engineer to date, and permits issued for the use of underground water. Includes Application No. 16497 which would divert 300 c.f.s. from Birch Creek in connection with Permit No. R-584 issued to the U. S. Bureau of Reclamation for storage in McKay Reservoir from McKay Creek and from Birch Creek. No permit has been issued for this application. It was the intention of the Bureau to construct a canal with capacity of 300 cubic feet per second to divert water from Birch Creek to the reservoir.

Before the construction of irrigation storage works is started, it should be determined whether the U. S. Bureau of Reclamation proposes to divert water from Birch Creek to McKay Reservoir. If





it does, the diversion of 300 cubic feet per second during the non-irrigation season would eliminate the storage by other interests of a dependable irrigation supply.

#### EFFECT OF PROJECT OUTSIDE OF WATERSHED

A Watershed project would appear to have limited effect on the areas outside the project with one exception; that is the possible diverting of 300 c.f.s. of water from Birch Creek to supply supplemental water for McKay Reservoir.

A watershed project involving storage of runoff water, its release in low water periods and stream bed stabilization in lower Birch Creek could have a desirable effect on Steelhead and Trout species both in the watershed streams and in the downstream runs of these fish.

U. S. Highway 395 between Canyon City and Pendleton and Oregon Highway 74 between Pendleton and Heppner cross the watershed at Pilot Rock. These highways are now subject to flooding and disruption of traffic in cases of any serious floods. Watershed project protection could eliminate or greatly reduce this hazard.

#### OTHER PROGRAMS

Neither the U. S. Forest Service nor the State Board of Forestry have programs in the watershed that would relate to Public Law 566, other than those already described.

#### LOCAL INTEREST

The Soil Conservation District program has received very favorable support in this watershed. Four of the five supervisors own and operate land within the proposed watershed.

The Farm Bureau and Grange both have active organizations within the watershed and have gone on record supporting it.

The Chamber of Commerce and Kiwanis clubs have agreed to support it by their resolutions.

A past president of the Chamber of Commerce, Paul Bracher, said he felt that all organizations favored this watershed movement.

The local newspaper editor, Dale Ammerman, at Pilot Rock showed interest in the project and will do what he can to help



mote it.

A number of farmers were contacted. They showed a great deal of interest in the project and said they would support it if it proves economically feasible.

No real opposition was found among either the town or country people.

It was recognized by the supervisors, farmers and ranchers that a watershed association would be necessary to set up needed finances and further the planning and management of a project.

### LOCAL PARTICIPATION

Funds can be raised for watershed programs by assessment under the Water Control District Act where a district enters into a contract with the United States, State or any agency or subdivision thereof, or with any municipal corporation for the construction of works.

Private and community groups are prepared to finance long time developments. The Farmers Home Administration can also participate in loaning money under approved conditions.

Under the provisions of the Water Control District Act condemnation proceedings may be utilized in obtaining land, easements and rights-of-way.

Banks and production credit for short term loans, Farmer's Home Administration for longer loans, Agricultural Stabilization and Conservation Program can assist by providing conservation practice payments to individual farmers and landowners of the watershed.

The sponsoring organization, the Southern Umatilla Soil Conservation District, has no finances for carrying on (1) investigations (2) installation and (3) operation and maintenance of the works of improvement at the present time. It would be necessary to raise funds through a water control district.

### ESTIMATED TIME TO COMPLETE PROJECT

#### LAND TREATMENT

Two years should be adequate to plan all of the needed conservation measures for the lands in the watershed. It is estimated that installation of these measures would require 10 to 15 years.



## STRUCTURAL MEASURES

It should be possible to plan and install all of the structural measures within a five year period.

### SUMMARY

Any flood with the intensity of the 1903, 1912 or June 22, 1938 will have far reaching affect on the people living in Pilot Rock as this town has expanded materially with the establishment of a lumber and fiberboard industrial development as well as the intensifying of agricultural and other local enterprises. It is estimated that the damages might exceed 1,500,000. Protection from such damages cannot be financed by the local people.

With this limited investigation it appears that there are two possible dam and reservoir sites which would be effective in storing water for the needed purposes.

There seems to be some good possibilities for fish and wildlife development.

It appears that the Southern Umatilla Soil Conservation District supervisors, local farmers and ranchers, people of Pilot Rock, administration of Pilot Rock Lumber and Fiberboard Company, and other local organizations have a keen interest in what can be done to alleviate their flood problems under a PL-566 project.

Any project that might be developed would necessitate close cooperation with the Southern Umatilla Soil Conservation District, State Engineer's office, U. S. Forest Service, Bureau of Reclamation, Corps of Engineers, U. S. Fish and Wildlife Service, State Game Commission, State Fish Commission, U. S. Bureau of Indian Affairs, and Soil Conservation Service.

As far as the field examination party could ascertain at this time and within the scope of the findings of the physical and economic possibilities, a watershed program would be practical and feasible, if the sponsoring organization obtains a written approval from the U. S. Bureau of Reclamation, stating that if a reasonable, workable, satisfactory watershed project can be developed under PL 566 they would relinquish their permit No. R-584 issued September 9, 1920. Until this provision is satisfied it is our recommendation that any further action be delayed.



T A B L E - A

State Engineer's Permits

Creek	Adjudicated		Stream Flow		Wells		Total	
	Acres	CFS	Acres	CFS	Acres	CFS	Acres	CFS
Birch	1552.7	19.44	706.30	305.41	424.4	7.63	2683.4	332.48
	(Power)	2.66	Other Purposes	(1) 2.0	Other Purposes	2.50		7.16
East Birch	758.0	9.48	65.5	0.90			823.5	10.38
West Birch	376.5	4.65	475.9	6.43			952.4	11.08
Steward	7.0	0.09	40.0	0.69	72.0	0.90	119.0	1.68
Stanley	19.5	0.25	3.0	0.04			22.5	0.29
California Gulch	12.0	0.15					12.0	0.15
Pearson & Johnson			77.3	1.02			77.3	1.02
Springs (Dom. & Irrig.)			4.6	0.31			4.6	0.31
Dear			20.0	0.25			20.0	0.25
Kenny Gulch			21.0	0.27			21.0	0.27
Total	2725.7	36.72	1413.6	317.32	496.4	11.03	4635.7	365.07

(1) Includes Permit No. R-584 issued to U. S. Bureau of Reclamation for 300 c.f.s diversion from Birch Creek to McKay Reservoir.





