This detailed working copy of the master plan for

HAT ROCK STATE PARK

is one of six loose leaf notebooks prepared by the Oregon State Parks Staff in 1983 for use by:

1 - State Park Manager at Hat Rock State Park

2 - Region 5 Parks Supervisor in La Grande

3 - Region 5 Parks Office - For loan to others

4 - Parks Design Unit Supervisor in Salem

5 - Salem Parks Headquarters - Parks Library

6 - Salem Parks Headquarters - for loan to others

As new pages of information are developed by any of the above sources, extra copies should immediately be made available to all of the above. The Design Unit Supervisor will review and coordinate the updating of the planning documents every two years.

Additional master plan background data is available in the files at the Salem Parks headquarters.

A condensed published version of the master plan is available from:

Parks Design Unit Supervisor
Oregon State Parks and Recreation Division
525 Trade Street SE, Suite 301
Salem, Oregon 97310

This plan was prepared by the Design and Master Planning Unit of the Oregon State Parks and Recreation Division, Nancy H. Gronowski, Project Manager.

| | |
|---|---|
| The Master Planning Process | 1.01 |
| Planning Process Chart | 1.03 |
| The Setting | 1.04 |
| Vicinity Map | 1.05 |
| USGS Quadrangle Map | 1.06 |
| Existing Facilities Map | 1.07 |

# BACKGROUND 1

# The Master Planning Process

In preparing a master plan for any state park, the following process is used:

The first step is to research all available data on the park, including information on the physical resources, the needs and desires of the park visitors and socio-economic data of the surrounding area. The regional park supervisor and the park manager are consulted about problems and needs which should be addressed as part of the master plan.

This research step also involves contacting agencies which may have information about or an interest in the park. Agencies typically contacted include the Oregon Department of Fish and Wildlife, the Soil and Conservation Service, the U.S. Geological Survey, local planning departments and county agencies.

As this data is being gathered, base maps are being prepared for the graphic display of the data. Various items which have been inventoried, including soils, vegetation, wildlife habitat, history and scenic qualities, are analyzed and mapped on transparent overlays. These maps show the areas which must be protected and those that are suitable for development. By combining these maps into a composite map, the planners can see what areas have qualities that need to be protected, which areas are unsuited for development and those areas which are most suitable for recreation development.

After all this data is prepared and analyzed, the land use plan is prepared. This plan shows the various land classifications and lists the kinds of uses which are allowed in each area. The land use plan is the guiding document used in preparing the detailed development plans.

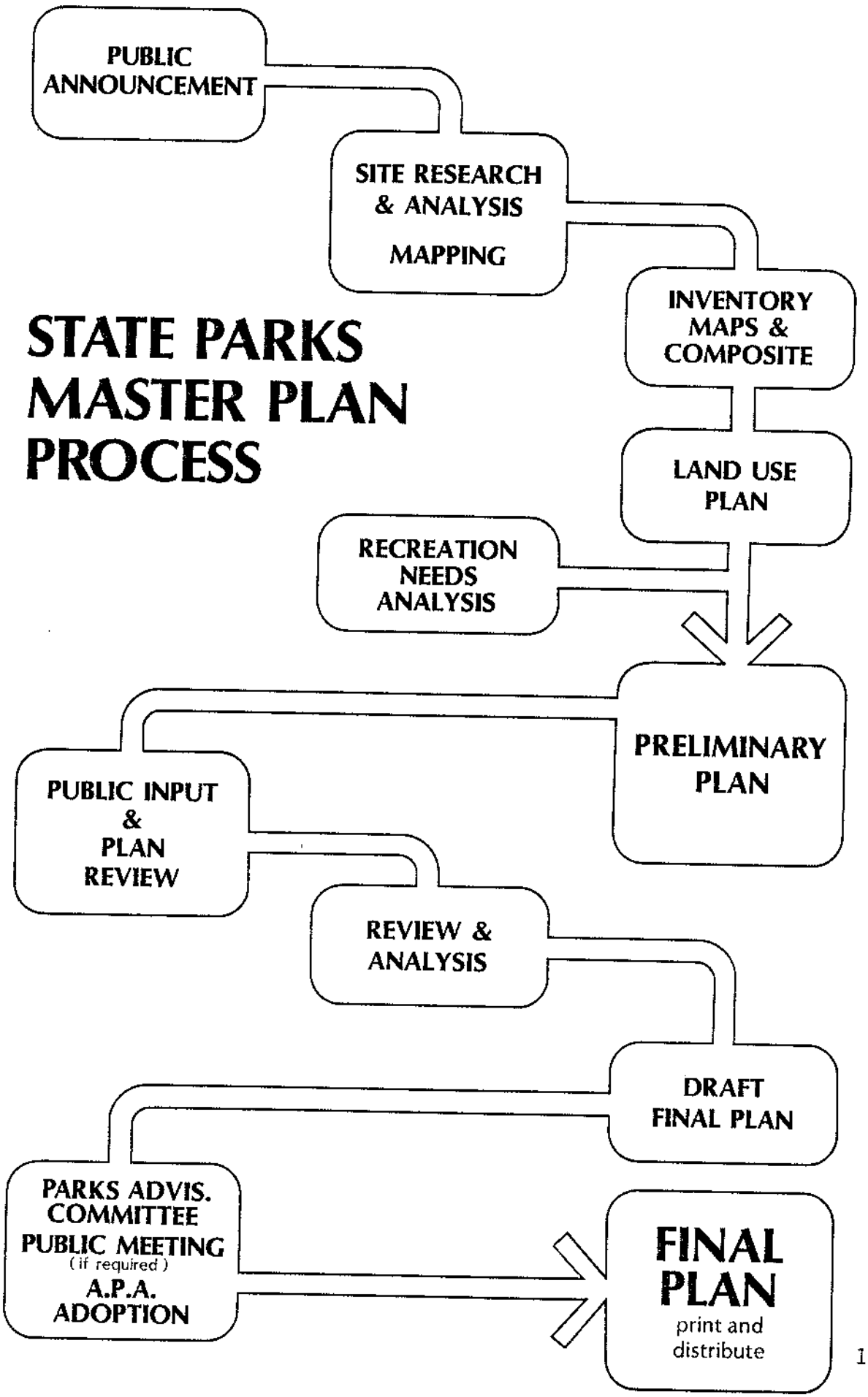
Preliminary development plans are then prepared based on the land use plan, existing conditions, visitor surveys and collected data. The preliminary plans are presented

for comment to the public and to various departments within the park system. Comments on the plan are incorporated into the draft final plan.

The draft plan is then sent to interested and affected agencies for their comments. The draft plan which is sent is an abbreviated document, presenting only that data which is of interest and value to the general public. While the agencies are reviewing the draft plan, the planners are preparing the detailed notebooks for the internal use of the Parks departments. After the draft plan is finalized, it is adopted by Administrative Rule. If any additional public meetings are required, they are held at that time. The plans are then printed and distributed.

The final plan is intended to serve as the guiding document for planning and development work for the next twenty years. The master plan is reviewed periodically to ensure that it is kept up to date and applicable.

# STATE PARKS MASTER PLAN PROCESS



# The Setting

Located in the northeast corner of Oregon near the Oregon/ Washington border, Hat Rock State Park overlooks Lake Wallula which was formed by damming the Columbia River at McNary, six miles downstream. The park is named for Hat Rock, the basalt landmark first noted by Lewis and Clark during their historic exploration of the Northwest. The rock is located in the northern portion of the park and is clearly visible from many vantage points within the park.

The terrain in and around the park is gently rolling, open land in an arid desert climate. Basalt outcroppings such as Hat Rock and Boat Rock are scattered throughout the area. Sagebrush predominates except where irrigation runoff has created small ponds of water or where irrigation has made the desert green.

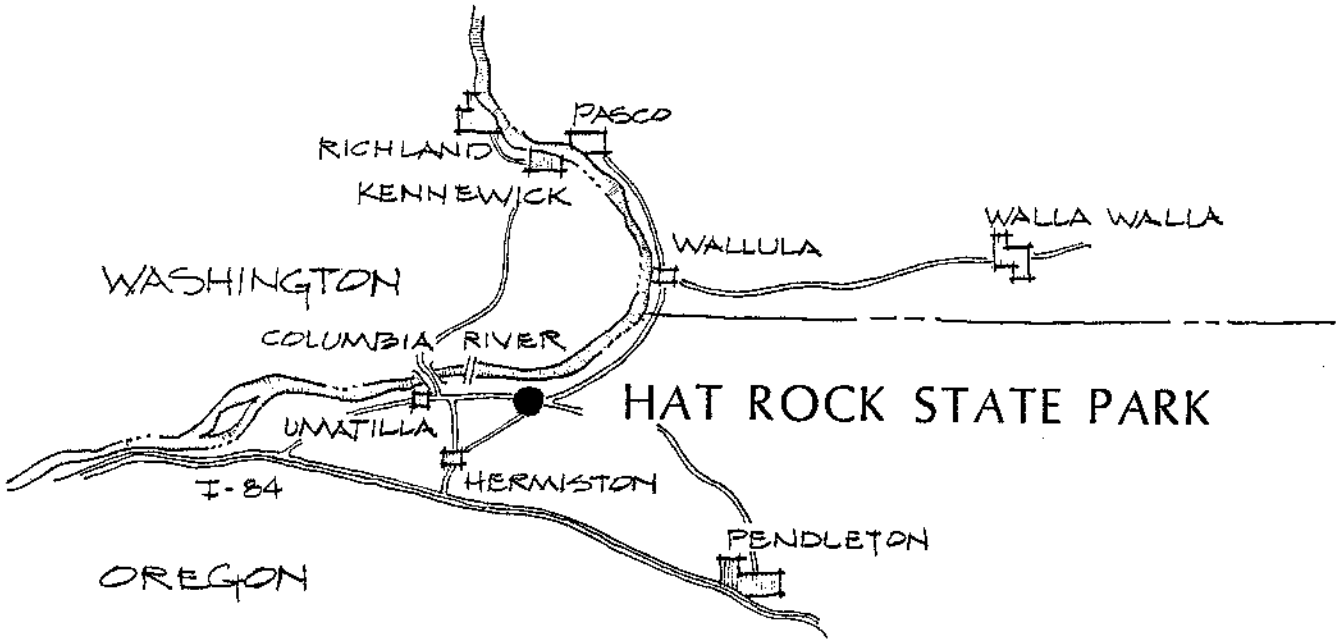
The most popular recreational activities at Hat Rock State Park are relaxing and picnicking. Generally, the areas where most of this recreational activity takes place are those which are irrigated and shaded, providing a cooler, more comfortable environment.

A natural spring located in the center of the park has been dammed to create a large pond. This pond is used for swimming as well as for fishing since it is regularly stocked with trout.

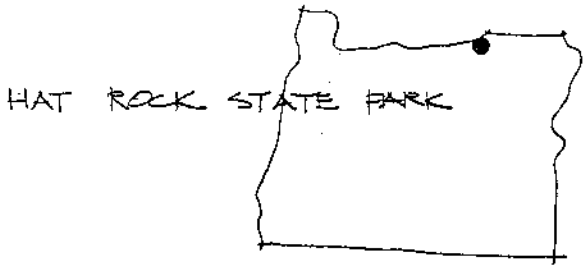
Other popular activities include sightseeing, hiking and boating. Boat launch facilities at the park provide easy access to the Columbia River.

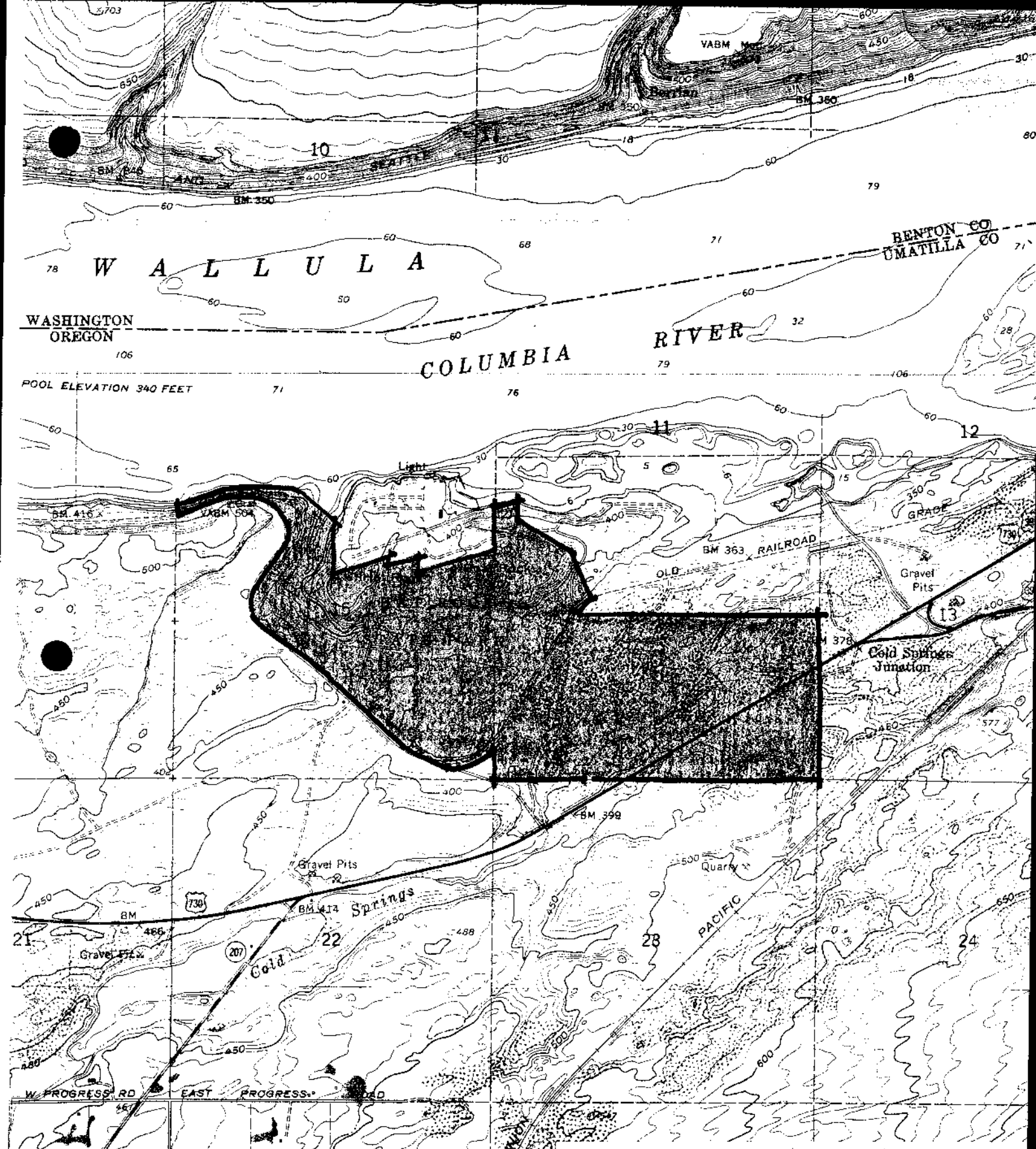
The park is heavily used, with average attendance figures approaching 200,000 visitors annually. Most of the park visitors come from Umatilla County and northeast Oregon.

Hat Rock State Park is a valued resource in this region, providing a needed source of recreation in an area which has few parks.




# VICINITY MAP






HAT ROCK QUADRANGLE (USGS)
UMATILLA COUNTY, OREGON
T5N, R29E, SECTIONS 14 & 15

1.06

DEVELOPMENT

COLD SPRINGS RECREATION AREA
(corps of engineers)

RT. 730

PONDS

COLD SPRINGS WASH

400' 800' 1600'
125m 250m 500m

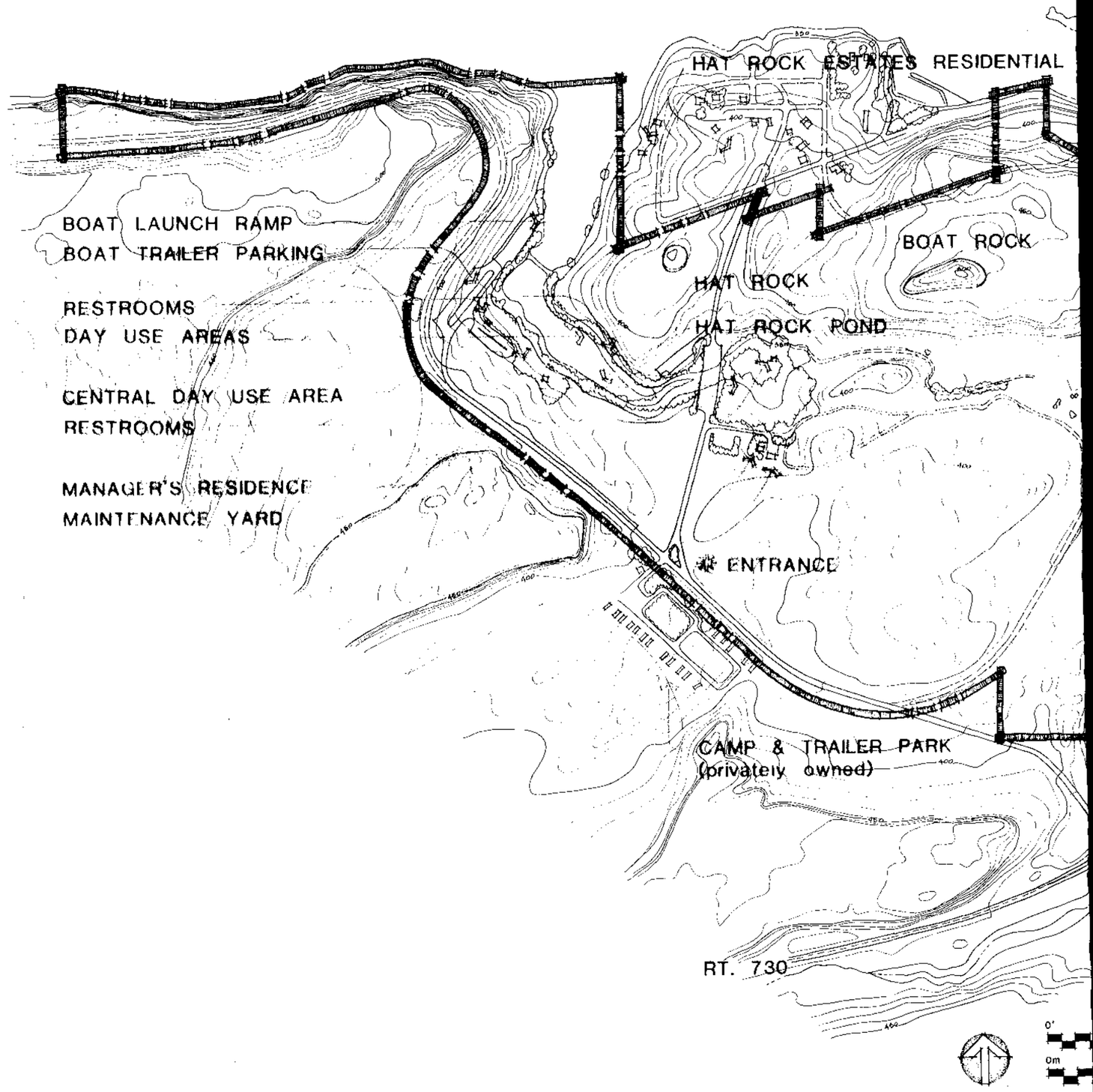
# HAT ROCK STATE PARK

UMATILLA COUNTY, OREGON

Date: Revised:

1.07

EXISTING FACILITIES


HAT ROCK ESTATES RESIDENTIAL
BOAT LAUNCH RAMP
BOAT TRAILER PARKING
RESTROOMS
DAY USE AREAS
CENTRAL DAY USE AREA
RESTROOMS
MANAGER'S RESIDENCE
MAINTENANCE YARD
BOAT ROCK
HAT ROCK
HAT ROCK POND
ENTRANCE
CAMP & TRAILER PARK
(privately owned)
RT. 730
0'
0m

| | |
|---|---|
| Land Use Classifications | 2.01 |
| Primary Protection Areas | 2.04 |
| Land Use Plan | 2.06 |
| Areas of Concern | 2.07 |

# LAND USE PLAN 2

# Land Use Classifications

As part of the master planning process, all park lands are analyzed and classified according to their potential value and function.

Natural resource data on such topics as wildlife, vegetation, soils and climate are inventoried and studied. The capability of the land and resources to withstand the impacts of recreational development is determined. Areas of particular importance are set aside to be preserved.

The following classifications designate the kind and amount of use that will be allowed to occur in the various areas. Land use classes range from those that provide maximum protection for the resources to those that allow for maximum development in areas which are capable of supporting recreation facilities.

## PRIMARY PROTECTION AREAS

### Values and Functions

These areas are among the most important park lands in the State Park system. These high quality resource lands include outstanding scenic features, major fish and wildlife habitats, historic sites and important ecological areas. These lands are retained for public inspiration, enjoyment and scientific study. Development is severely restricted so that little or no impact occurs.

### Proposed Land Uses

The primary protection areas include the significant land forms of Hat and Boat Rocks and the bluffs along the banks of Lake Wallula. Views, scenic quality, geology and wildlife habitat restrict the allowed uses in these areas. Pedestrian access will be developed and simple interpretative devices will be installed.

## SECONDARY PROTECTION AREAS

### Values and Functions

These park areas are important for the protection of water, wildlife, vegetative and other area interests. The lands are utilized for scenic value, open space and buffer zones, soil stabilization areas, watershed control and other park purposes. Development includes those activities which have a low impact on the landscape. Future land use flexibility which allows for the expansion of protection or development categories is provided for in these areas.

### Proposed Land Uses

The wetlands and wildlife habitats of Hat Rock are included in the secondary protection areas. Foot trails and minor roads will be allowed in these areas. The areas will be managed primarily for their value as wildlife habitat and for their ecological diversity.

## LIMITED DEVELOPMENT AREAS

### Values and Functions

These lands are suited for limited development which has a low to moderate impact on park natural resources. Low density or passive recreation activities occur here.

### Proposed Land Uses

The areas within Hat Rock designated for limited development are open, arid lands. There are no special qualities which need to be protected. Although the soils here are prone to wind erosion, proper soil stabilization will allow for some development. Uses here will include expansion of picnicking facilities and trails.

## MAJOR DEVELOPMENT AREAS

### Values and Functions

These areas are most suited for modification to accommodate high density development. Active recreation, intensive use and extensive man-made operations occur here. Development which may cause heavy impacts on or major modifications to the landscape occurs in this area.

### Proposed Land Uses

Major development will be allowed in those areas where there are no significant restrictions to development and where there are no qualities needing special protection. Camping, play areas and additional day use facilities are proposed for the major development areas.

# Primary Protection Areas

There are four areas in Hat Rock State Park designated for Primary Protection. Briefly, they are as follows:

## HAT ROCK

The first area designated for Primary Protection is Hat Rock itself. This landform is of scenic and historic importance. It was the first landform in Oregon noted by Lewis & Clark during their 1805-06 Voyage of Discovery, and it continues to be of scenic interest. The rock is also of geologic interest since it is a large remnant of the basalt flows which occurred millions of years ago.

## BOAT ROCK

Another area for Primary Protection is Boat Rock, which is also a basalt remnant located near Hat Rock. It, too, is of geologic and scenic interest. For those willing to make the effort to climb to the top of Boat Rock, there is an excellent view of the surrounding countryside. The upper surface of the rock has vegetation different from that found in the rest of the park. The rock also provides habitat and shelter for wildlife and birds.

## BASALT CLIFFS ABOVE LAKE WALLULA

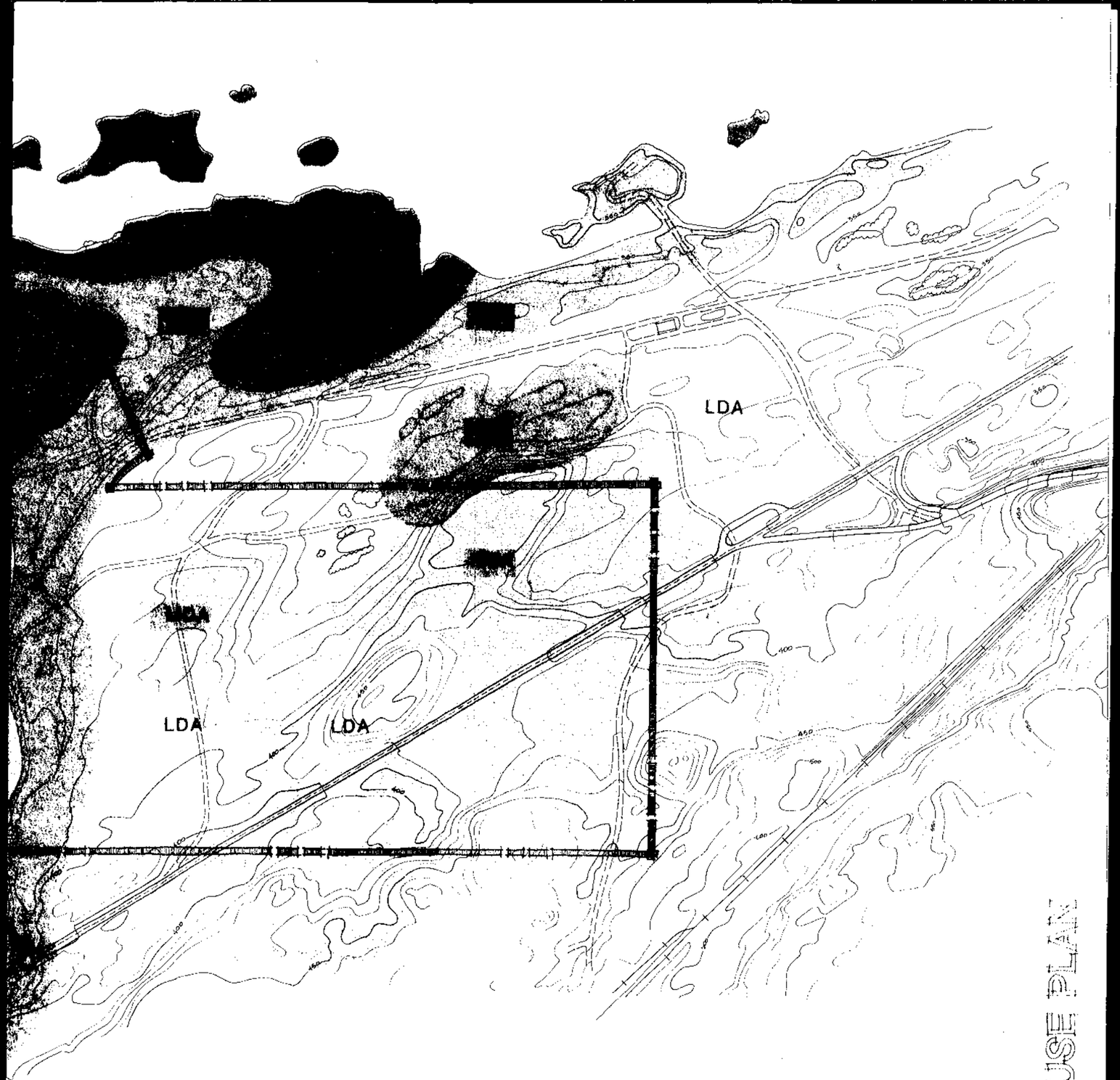
The narrow finger of park property at the west end of the park, above Lake Wallula, has some of the more interesting wildlife habitat in the park. These basalt cliffs are the home for the largest known concentration of barn owls in the state, as well as home for many other birds and small mammals. From the old railroad bed at the base of the cliffs, one has some excellent views of Lake Wallula with its barge traffic and scenic attractions. The basalt cliffs are of geologic interest as well.

## WETLANDS AND ISLANDS NORTH OF THE PARK

This area is on land presently owned and managed by the Corps of Engineers. It is a large and important wildlife habitat which has a lot of vegetation, water much of the year, and provides food and cover for many animals.

This area is identified in the Corps of Engineers Draft Plan for McNary as a Desgnated Wetland, which gives it Presidential protection.

In addition to the vegetation and habitat values, there is also scenic attraction to the area since it provides a different visual quality from the typical desert environment found in the park.




400' 800' 1600'
125m 250m 500m

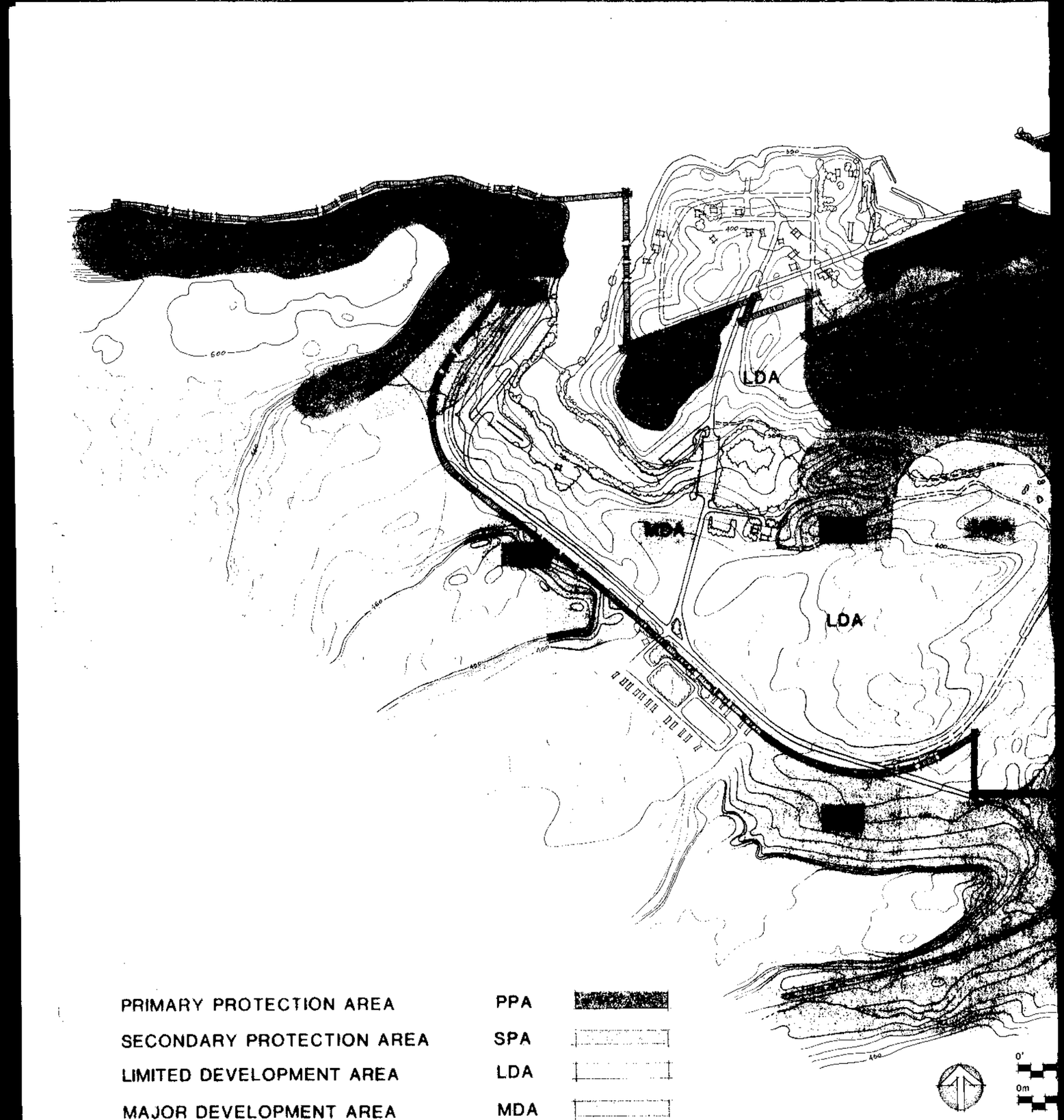
# HAT ROCK STATE PARK

UMATILLA COUNTY, OREGON

Date: Revised:

2.06

LAND USE PLAN




| | | |
|---|---|---|
| PRIMARY PROTECTION AREA | PPA | |
| SECONDARY PROTECTION AREA | SPA | |
| LIMITED DEVELOPMENT AREA | LDA | |
| MAJOR DEVELOPMENT AREA | MDA | |

# Areas of Concern

There are a number of pieces of property adjacent to the park which are areas of concern. If development were to occur in these parcels, the visual impact would be quite obvious from the park. Since it is quite difficult to screen out unwanted elements in this open arid climate, it will be important to keep track of any proposals for development. Of course, it would be easier if we owned all the areas which are visible from the park, but it is unlikely that this will be possible under the present budgetary constraints.

An area of particular concern is the land between the present park property and Route 730. This parcel consists of 2 pieces of land on either side of the 80-foot entrance easement to the park. We hope to acquire this property outright, but if we are unable to do so, we need to be aware of any proposed change from its present condition. This area has interesting terrain and provides the first view of Hat Rock as one approaches the park entry. The character of the landscape is typical of the desert environment and is a good backdrop to the park itself.

East of the park is a parcel of land which is owned by Lewis and Clark College from Portland. The land is one of the only privately owned parcels fronting on Lake Wallula. The College has plans to develop the parcel as a private recreation facility and sailboat marina. The recreation facility will be for the private use of condominium and home owners in the development which Lewis and Clark College will build on 3,700 acres farther east of the park. The Lewis and Clark Development staff has been working with the Umatilla County Planners and with State Parks to bring this project to reality, but some local sentiment is against it. After a recent hearing before the County Planning Commission, the College has decided to withdraw their proposal for the time being.

State Parks had approved of the development which the College had proposed, but it may change. We should be aware of any changes in the proposal if the College decides to resubmit the proposal to the County.

Another area of concern at the park is the trailer park across the road from the present park entrance. This development is not the most attractive development to have opposite the park entrance. If any changes are proposed, we should be aware of these and influence them to the degree possible.

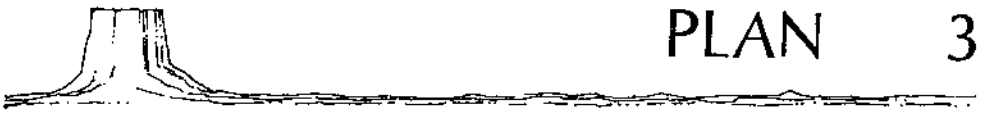
We also need to be aware of any proposed residential construction south and west of the park. One home was recently built which is very noticable from the park and impossible to hide. These kinds of development should be dissuaded if possible.

The Corps of Engineers' report on the McNary Dam and pool recommends that the State eventually take over and operate a marina in the area now leased by the McNary Yacht Club. At this time, the State Parks Division is not interested in developing or running a marina concession near the park.

Since the yacht club is now operating on a yearly renewal lease from the Corps of Engineers, this situation bears watching. Any development in that area north of the park has a great potential to affect park use, since all the traffic which goes to that area passes through the center of the park.

| | |
|---|---|
| Development Program Objectives | 3.01 |
| Capitol Improvement Projects | 3.02 |
| Rehabilitation Projects | 3.12 |
| Development Costs | 3.27 |
| Impacts of Park Development | 3.30 |
| Handicap Accessibility | 3.31 |
| Development Plan | 3.32 |


# DEVELOPMENT PLAN 3



# Development Program Objectives

The development plan has been prepared in response to the following needs and priorities.

- To retain the family use orientation of activities at Hat Rock.
- To relieve crowded conditions in the picnic areas by providing group day-use facilities.
- To improve the vehicular circulation to and through the central picnic area.
- To enhance and improve the entrance to the park.
- To develop an attractive swimming beach and picnicking area at Lake Wallula.
- To develop the ponds into accessible and attractive recreation/fishing areas.
- To provide quality campgrounds in an attractive setting.
- To link the recreation facilities at Hat Rock with those at McNary Beach by construction of a bike trail.
- To develop hiking and nature trails between various points of interest.
- To provide interpretation of natural and historic features at Hat Rock.

Capitol Improvement Projects

Project: CAMPGROUND CONSTRUCTION

Construction Cost: $425,000

Annual Maintenance Cost: $63,000

Staff Required: 1.85 FTE

Existing Conditions:

At the present time, the need for camping facilities is being met by the privately owned campground at the entrance to the park. When there is a demonstrated need for additional camping space, campgrounds should be developed at Hat Rock. Since there are no areas feasible for development within the existing park boundaries, development of a campground will require acquisition of additional land.

Proposal:

The area which is most desirable for the construction of campgrounds is near the present northern border of the BLM patent land. It is sheltered from the frequent winds, close to a number of ponds and near some of the few existing trees. It is also within a short drive of the swim beach at Cold Springs.

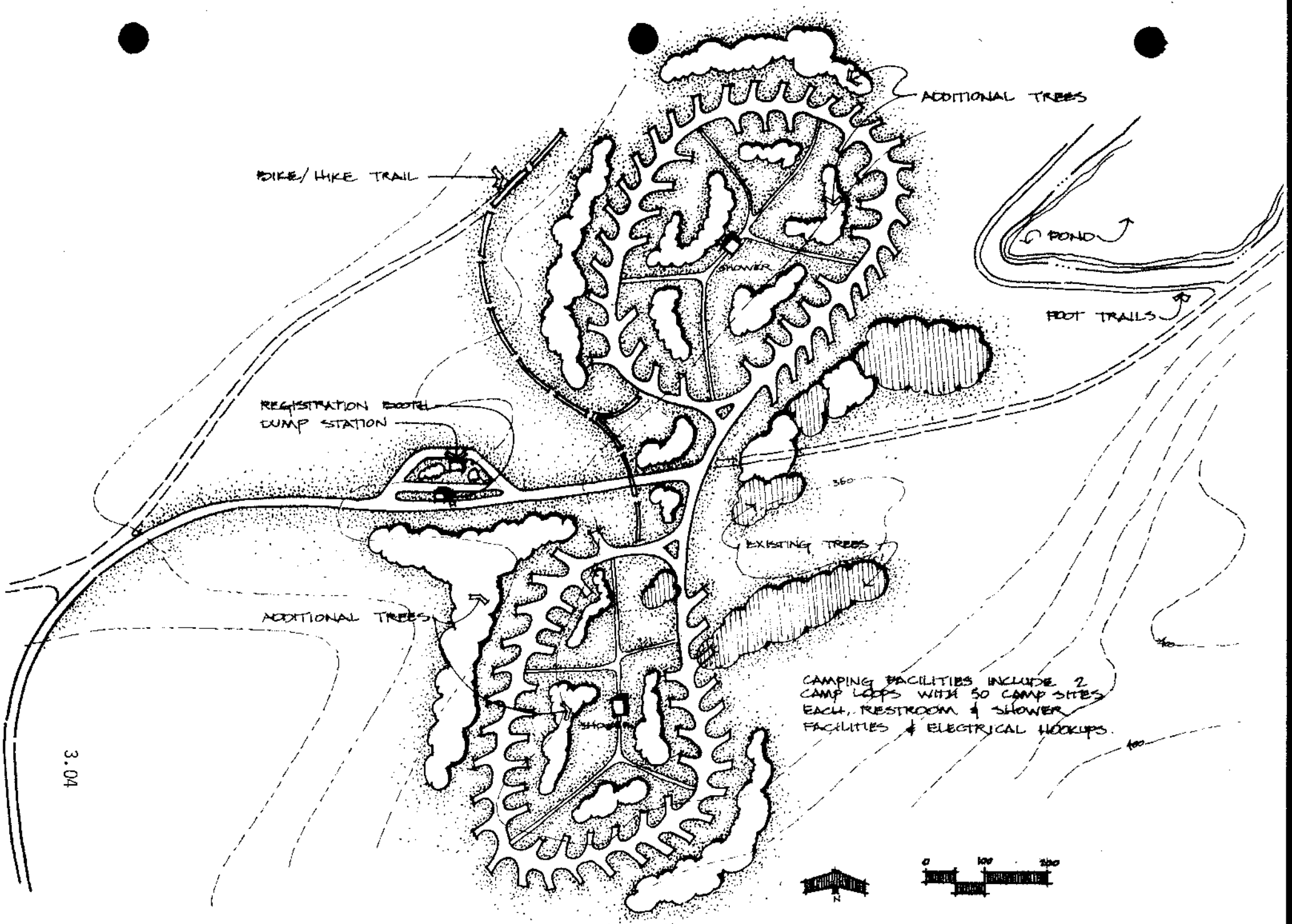
It is proposed that the campground consist of two loops with each having approximately 50 sites. Each site will have an electrical hookup. Since there is little natural screening between camp sites, artificial screens will be needed until vegetation can be planted to grow to a height which will provide privacy.

A utility building will be constructed to serve the first camp loop. When the second 50-site loop is developed, an additional restroom building will be built to serve that area.

In siting these buildings, solar orientation should be considered since this area favors solar applications.

An entry booth and dump station will be located near the campground entrance.

The access road to the campground will be a two-lane, paved, standard park road about 1800' in length. The interior circulation roads will be single lane, one-way, paved roads, about 2000' in length.




3.04

# CAMPGROUND DEVELOPMENT

Capitol Improvement Projects

Project: GROUP-USE PICNIC AREA

Construction Cost: $245,000

Annual Maintenance Cost: $32,000

Staff Required: 0.90 FTE

Existing Conditions:

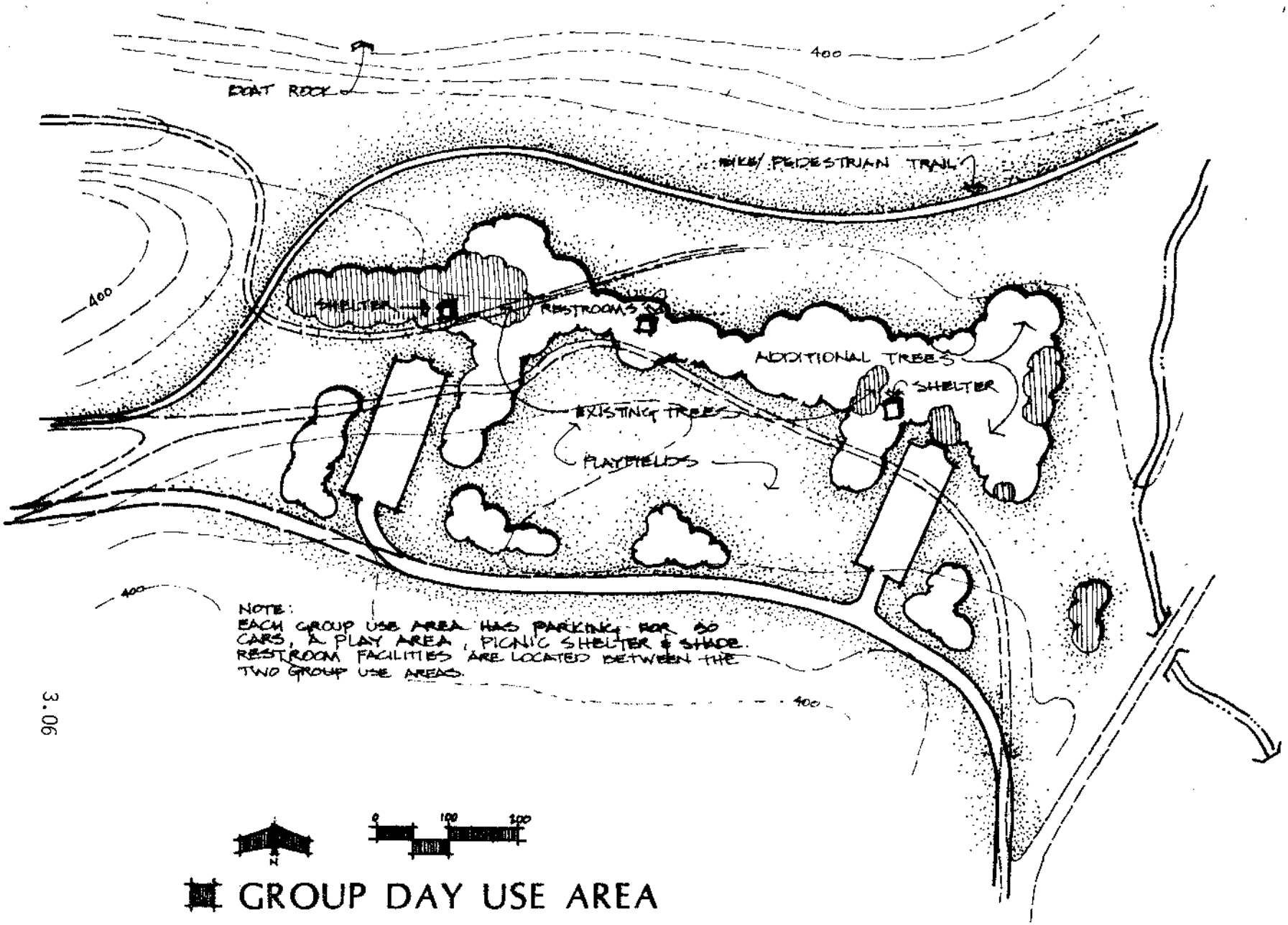
At present there are no areas whch are reservable for large groups, apart from the general picnic areas.

Proposal:

A major need at Hat Rock is for reservable picnic space for use by larger groups for such things as family reunions and office picnics. An area east of the existing picnic area and maintenance yard is well suited for development as a reservable area. The area is sheltered and somewhat private from the rest of the park. It is generally flat with some fairly large trees already established.

Space exists for two separate picnic areas with a shelter, play field area, and shaded picnic grounds for each. The two areas will share a centrally located restroom building.

Access will come from the park road along the existing railroad right-of-way. The road will be a standard, two lane paved park road since it also serves as access to other recreation facilities.




GROUP DAY USE AREA

Capitol Improvement Projects

Project: NEW ROADWAY CONSTRUCTION

Construction Cost: $200,000

Annual Maintenance Cost: $8,000

Staff Required: 0.25 FTE

Proposal:

As new facilities such as the campground, maintenance yard and swim beach are developed, new roads will also be constructed. These are to be standard, paved, two-lane park roads, 22' in width.

Capitol Improvement Projects

Project: BOAT HANDLING DOCK

Construction Cost: $10,000

Annual Maintenance Cost: $1,000

Staff Required: 0.05 FTE

Existing Conditions:

A boat launch ramp and boat trailer parking lot exist at the park. Although these areas are heavily used, there is little room to widen the ramps or provide any more parking.

Proposal:

There is little room for any expansion of the existing boat ramps but installation of a handling dock will help to alleviate the occasionally crowded conditions.

A wood courtesy dock, 8' x 40', will be installed in a suitable location, to be chosen at a later time.

Although the boat ramps cannot be widened, there is a need to lengthen them. At low pool elevations of 336', the ramps are difficult to use. They should be lengthened in order to be useable at the lowest pool elevation of 335'.

STATEWIDE BOATING FACILITIES PLAN

1979 - 1983

Table 30

BOATING FACILITY NEEDS

UMATILLA COUNTY

| FACILITY NEEDS | LOCATION | POTENTIAL SPONSOR | COST(EST.) | YEAR | COMMENTS |
|---|---|---|---|---|---|
| Courtesy Loading Docks | Hat Rock State Park, Lake Wallula | Umatilla County/ Oregon State Parks/ Corps of Engineers | $ 5,000 | 78-79 | Cost Sharing; Cooperative Development |
| Water, Showers, Sanitary Pumpout Facility, Dry Storage | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 10,000 | 79-81 | |
| Moorage, 50 30' Slips, Covered (Phase I) | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 100,000 | 79-81 | |
| Parking, Dry Storage | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 20,000 | 79-81 | |
| Moorage, 30 40' Slips (Phase II) | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 75,000 | 81-83 | |
| Moorage, 50 22' Slips (Phase III) | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 90,000 | 81-83 | |
| Moorage, 50 18' Slips (Phase IV) | Umatilla Marine Park, Lake Umatilla | Port of Umatilla | 50,000 | 81-83 | |
| Improve Ramp, Restrooms | McKay Reservoir | Umatilla County | 10,000 | 79-81 | |
| | | TOTAL | $ 360,000 | | |

Capitol Improvement Projects

Project: BIKE & HIKE TRAILS

Construction Cost: $165,000

Annual Maintenance Cost: $10,000

Staff Required: 0.30 FTE

Existing Conditions:

A few foot trails exist in the park. A paved trail goes the full distance around the pond and a path has been developed around Hat Rock.

An old abandoned railroad bed passes through the park. This bed is about 10' wide, flat and well-graded.

A new bike trail was recently completed near the park. The trail was built adjacent to the widened Highway 207. This trail is about a mile from the park.

Proposal:

As various new developments are constructed in the park, hike and bike trails connecting these facilities to others in the park should be built. For example, trails should go from the campground to the beach area, the picnic areas and to Hat Rock.

City and county planners should be consulted for future bike trail planning. Connection with the new bike trail along Highway 207 should be considered.

The foot trails should be a minimum of 4' wide, well graded and signed.

The bike trail should be 8' wide, paved and signed.

Wherever possible the existing grade of the railroad bed will be used as the base for the trail.

Capitol Improvement Projects

Project: PARK INTERPRETATION DEVICES

Construction Cost: $5,000

Annual Maintenance Cost: $1,000

Staff Required: 0.05 FTE

Existing Conditions:

Natural features such as Hat Rock, geology, wildlife and plants are items of interest. The history of the area, including the railroad, shipping on the Columbia River and early trails are also features which could be interpreted.

Proposal:

Many of the features which are to be interpreted are along various trails which will be developed. Interpretive signs made of vandal-resistant materials should be installed along the trails. The signs should be placed so that they do not interfere with passage of foot or bicycle traffic along the trails.

Capitol Improvement Projects

Project: FISHING PONDS & TRAILS

Construction Cost: $30,000

Annual Maintenance Cost: $4,000

Staff Required: 0.10 FTE

Existing Conditions:

A series of small, shallow ponds are located at the eastern edge of Hat Rock State Park, close to the proposed campground development.

Proposal:

Since the ponds are close to the proposed campground, it is suggested that they be developed for family use. The development could include stocking the ponds with fish and building trails and fishing platforms around the edges of the ponds. The ponds could also be used for wildlife and natural resource interpretation. A self-guiding nature trail around the ponds would be an interesting feature.

Rehabilitation Projects

Project: ENTRY DRIVE REHABILITATION

Construction Cost: $15,000

Annual Maintenance Cost: $2,000

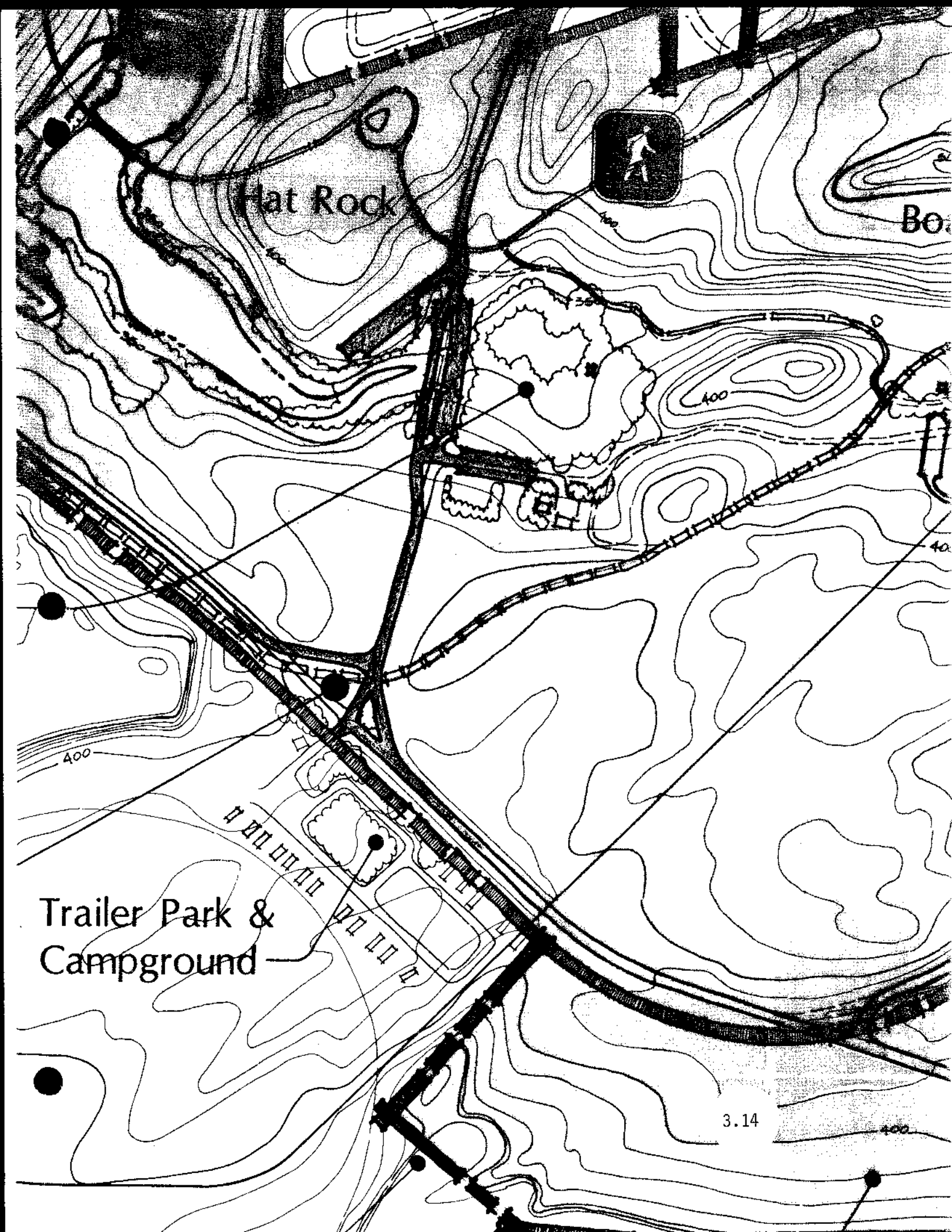
Staff Required: 0.05 FTE

Existing Conditions:

The existing park entrance is a point of some confusion since a private campground and trailer park named "Hat Rock Campground" is directly across from the park entrance. Also, the park entrance road splits at this point going to different facilities.

Proposal:

Confusion at the park entrance can be alleviated by realigning the park entrance road as shown on the accompanying drawing. The relocation of a portion of the entry drive will improve traffic circulation to Hat Rock State Park. This relocation will improve the safety and attractiveness of the drive and enhance the flow of traffic. The new road alignment will clearly direct traffic to the park and will also allow easy access to the private trailer park and to the west end of the park.


Hat Rock
400
Trailer Park &
Campground

Rehabilitation Projects

Project: PARKING LOT REALIGNMENT

Construction Cost: $35,000

Annual Maintenance Cost: $4,000

Staff Required: 0.10 FTE

Existing Conditions:

Within the park, a circulation problem is created by traffic going to the residential development north of Hat Rock State Park. This traffic goes through the central picnic area of the park, presenting problems of safety, park security and appearance.

The residential road is straight, going through a large parking lot and separating the parking area from the adjacent picnic area. This is a hazardous situation for people going from their cars to the picnic area. Additionally, the large expanse of asphalt cannot be gated or secured and the view of the lot is unattractive.

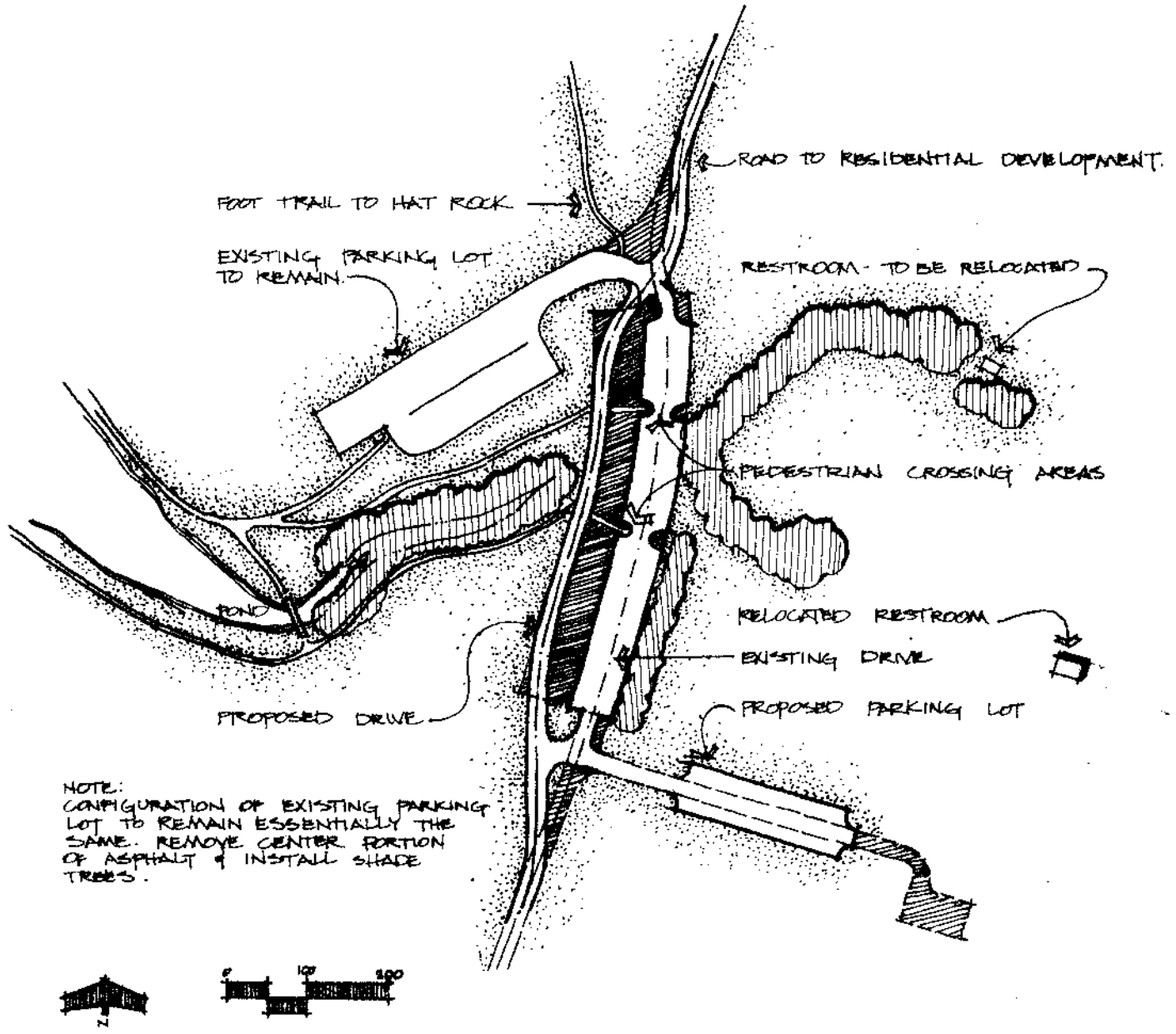
Proposal:

The poor layout of the parking lot can be remedied by redesigning the existing asphalt area and adding trees to the lot. The area can be made much safer by shifting the access road from the east side of the lot to the west side. This will reduce the straight line effect, allow the parking to be separated from the access road and keep traffic from passing between the parking and picnic areas.

With the parking separated from the drive, the lot can be made secure by the installation of gates and locks.

The appearance of the lot can be improved by eliminating one lane of parking and planting a row of shade trees. This will make the lot more attractive and more comfortable.

Elimination of a portion of the parking area will reduce the number of cars that can be accomodated in that lot by about 40 vehicles. The effect of this loss can be alleviated by use of the existing lot north of this lot, by restripping the lot for narrower parking spaces and by the construction of a small (50 car lot) south of the existing lot, at the entrance to the maintenance yard.




# DAY USE AREA - parking lot realignment

Rehabilitation Projects

Project: MAINTENANCE YARD RELOCATION & EXPANSION

Construction Cost: $175,000

Annual Maintenance Cost: $11,000

Staff Required: 0.30 FTE

Existing Conditions:

The present maintenance yard is quite small and in an area where future expansion is not feasible.

Expansion of the recreation facilities at Hat Rock will require expanded maintenance facilities.

Proposal:

At the time that the camp ground is developed, the maintenance yard should be relocated. An excellent site for the yard is near the new campground. The site is close to Route 730 allowing for easy access to and from it, yet sheltered from the view and noise of the highway.

The new yard will include employee parking, the park headquarters office, repair shop facilities and service bays for four vehicles.

Relocation of the yard will also entail relocation of the park manager's home to the same general vicinity.

Rehabilitation Projects

Project: COLD SPRINGS SWIM BEACH REHABILITATION

Construction Cost: $195,000

Annual Maintenance Cost: $25,000

Staff Required: 0.70 FTE

Existing Conditions:

The Corps of Engineers maintains a beach, gravel parking area and brick vault toilet building at Cold Springs on Lake Wallula. Access is from Route 730, under a low bridge, on a narrow gravel road. The area is not developed for intensive use, though it does get fairly heavy use.

Proposal:

It is proposed that the State acquire this portion of Corps property, improve the facilities and change the access. The existing vault toilet is to remain for the time being.

Auto traffic will be confined to the roads and parking lots instead of being allowed to drive anywhere unrestricted. Two parking lots will be developed away from the immediate beach area, thereby allowing more of the beach area to be used for recreation.

Access to the beach will be from a new road constructed within the park boundaries. Only bike and pedestrian traffic will be allowed out onto the peninsula portion of the Cold Springs area.

Additional picnic areas will be developed around the beach area. Trees will be planted and irrigation will be installed to keep the picnic areas cool and shaded.

Since this beach area is near privately owned land which will be developed for private recreation, detailed planning should ensure that we do not encourage trespass onto these private lands.

Rehabilitation Projects

Project: POND REHABILITATION

Construction Cost: $10,000

Annual Maintenance Cost: $1,000

Staff Required: 0.05 FTE

Existing Conditions:

See the notes on the Hat Rock Impoundment in the Site Inventory Section for a detailed discussion of the pond condition.

Proposal:

After pond rehabilitation has been accomplished, a portion of the banks of the pond need to be regraded to create a sloping access to a small swimming area.

Bank areas that are adjacent to fishing spots can be steeper. If erosion is a factor, sheet piling or some other control should be installed along the banks.

Mechanical methods can also be used to help keep the pond clean. The overflow devices at the north end of the pond, close to the dike, should be modified so that the water level of the pond can be dropped. The pond can then be flushed of some of the excess weed growth. Another way of flushing the pond would be to replace a portion of the dike with a weir.

Another method to be investigated for improving the water quality of the pond is aeration. Circulating pumps and aerators could help reduce the weed growth by getting more oxygen into the water.

Rehabilitation Projects

Project: DIKE REHABILITATION

Construction Cost: $35,000

Annual Maintenance Cost: $4,000

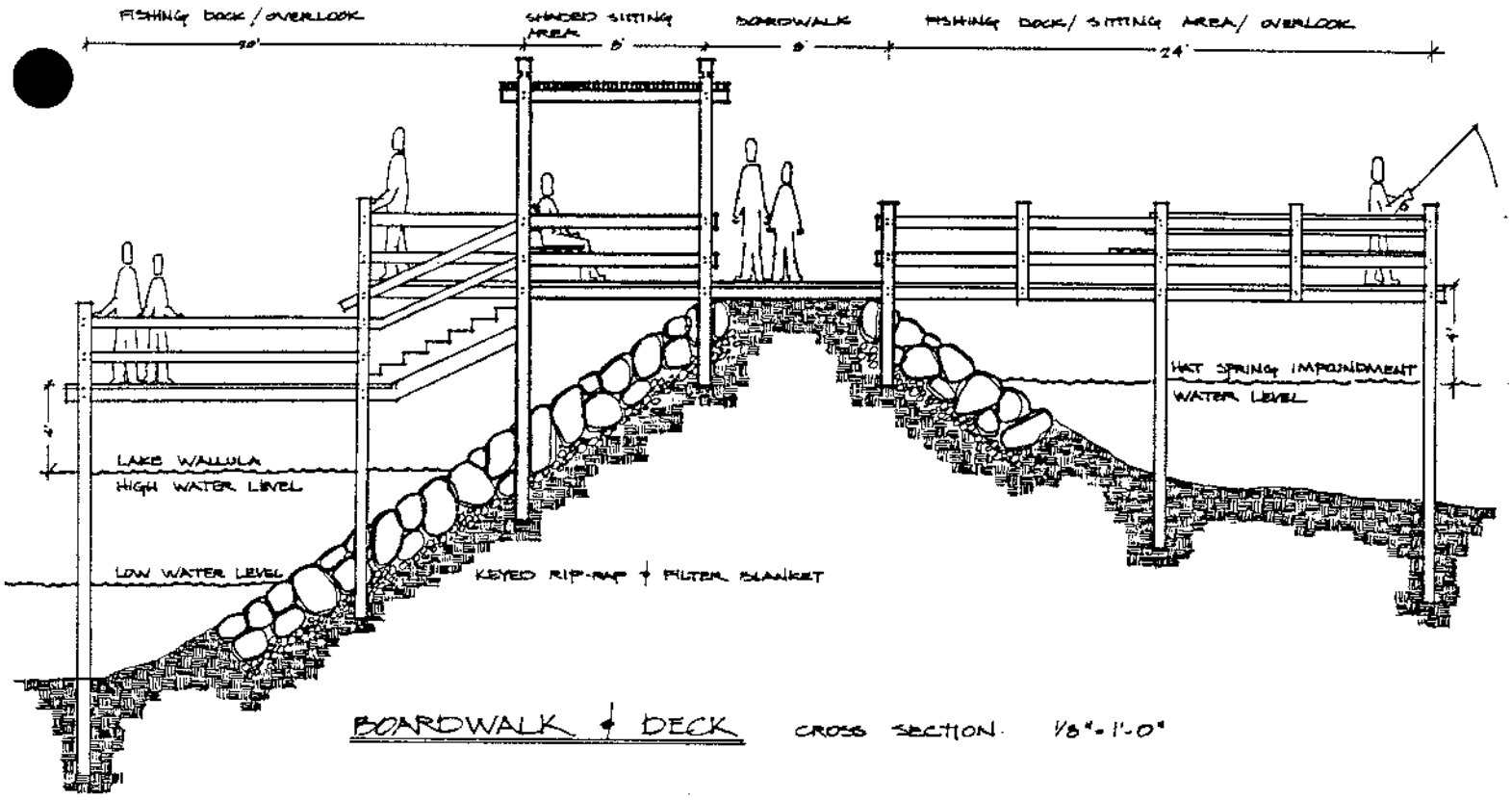
Staff Required: 0.10 FTE

Existing Conditions:

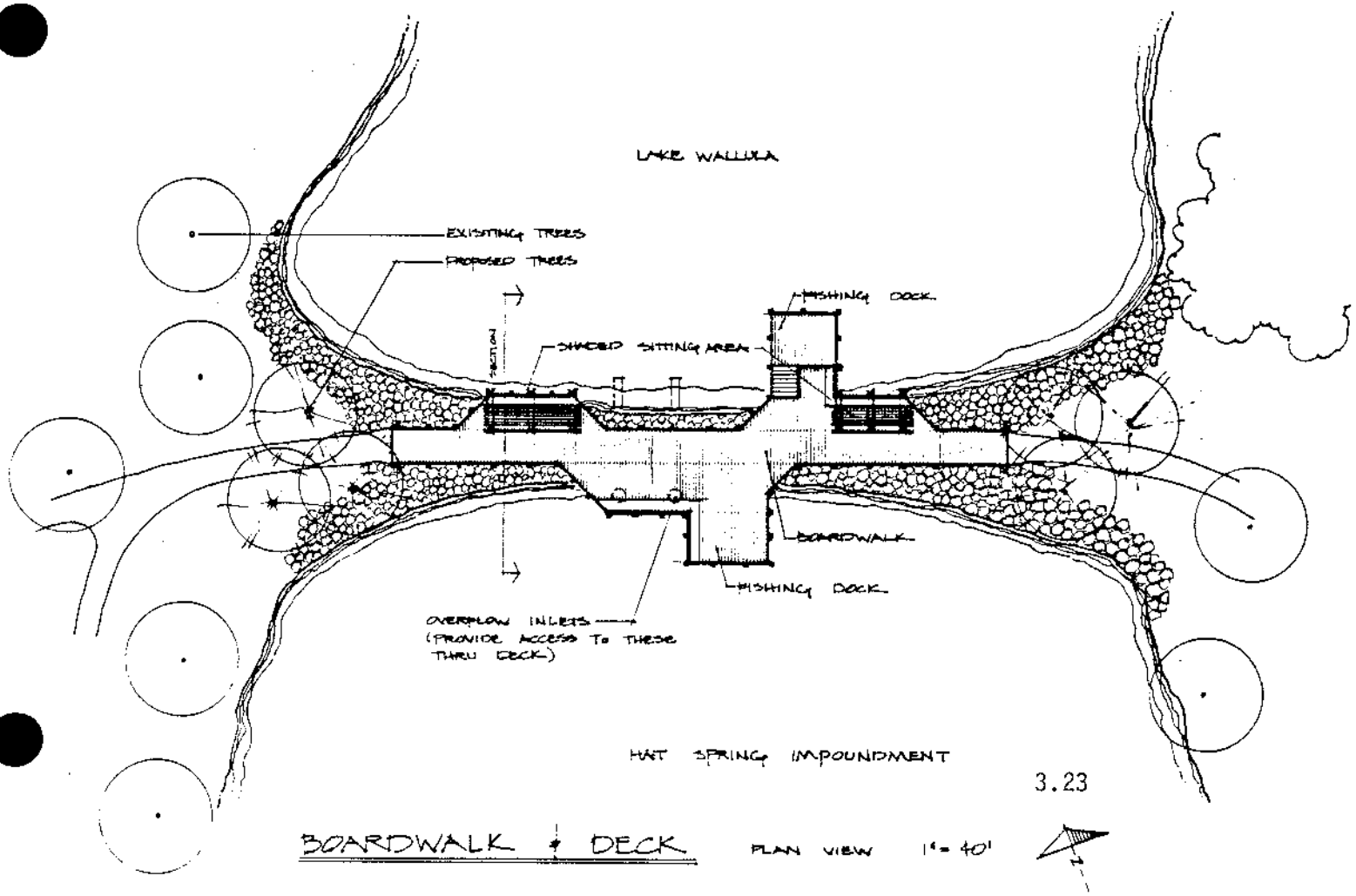
The existing earthen dike was constructed in 1969 and is now in need of repairs and enhancement. A narrow, unattractive asphalt path crosses the dike, connecting the east and west banks of the pond. There is no vegetation growing on the dike and the bare earth is gradually eroding away.

Proposal:

In order to make the dike into an amenity instead of just an access trail, the dike will be stabilized and widened. A new walkway with widened areas for benches and fishing docks will be constructed over the existing dike. Plantings will be installed to enhance the appearance of the dike and provide some erosion control.




BOARDWALK & DECK CROSS SECTION 1/8"=1'-0"




3.23

BOARDWALK & DECK PLAN VIEW 1"=40'

Rehabilitation Projects

Project: RESTROOM CONSTRUCTION

Construction Cost: $50,000

Annual Maintenance Cost: $4,000

Staff Required: 0.10 FTE

Existing Conditions:

a. In 1982, a new Type 4 restroom building was constructed. This replaced existing restroom buildings on the west side of the pond and allowed for removal of the portable toilets near the boat ramp.

b. The existing restroom on the north side of Hat Rock Spring Impoundment is in need of repair work. Dry rot is present in the roof and wing walls.

c. The restroom facilities in the central picnic area are pit toilets and should be replaced with flush toilets in a more central location.

d. The brick vault toilet in the Cold Springs recreation area is in good condition at this time.

Proposal:

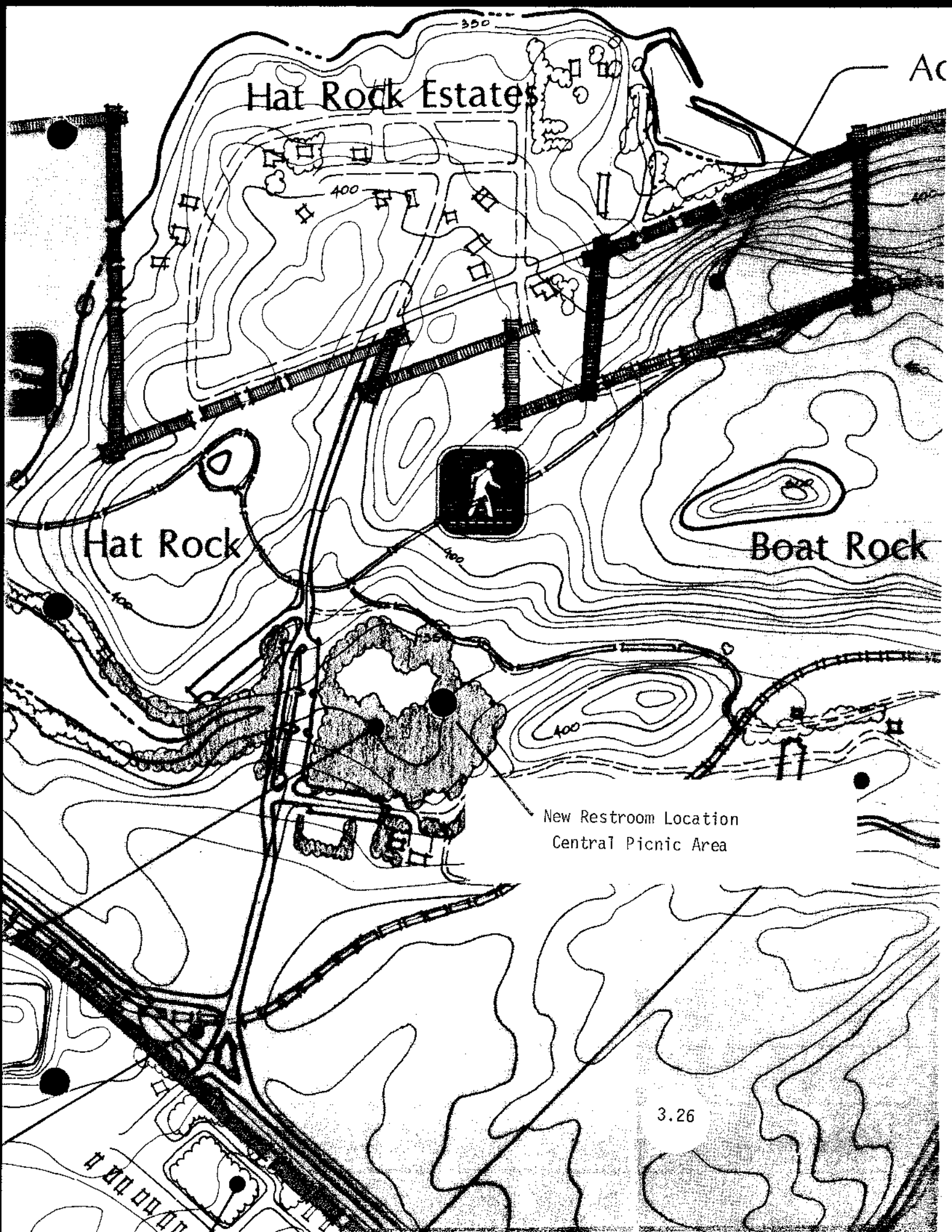
a. No additional work required.

b. Replace the roof and wing walls of the north restroom building as soon as possible. Make any other repairs necessary to keep the building in good repair.

c. When the restrooms in the central picnic area are replaced, they should also be relocated. An area close to the center of the picnic area, more accessible to the majority of users is preferred. (See map for proposed site.) A Type 4 brick building is recommended.

d. At some time in the future, the restroom facilities at Cold Springs will need to be reevaluated. The restroom building may require expansion, alteration or replacement.

   Since this is a popular swimming area, we may also want to construct showers and changing room facilities. This would require the installation of water and sewer lines.


Hat Rock Estates
Hat Rock
Boat Rock
New Restroom Location
Central Picnic Area

# Development Costs

With tight fiscal budgets causing reductions in construction spending, the state is looking at ways to control the costs of development.

One way is to take advantage of the cost sharing program from the Corps of Engineers. This program allows for 50/50 sharing of the cost of new recreation facility construction between the Corps and a local sponsor. The Corps and the State would each pay 50% for new construction. It may be possible under this program to further reduce our out-of-pocket costs for construction by selling our fee title lands to the Corps. We could then use the money earned by that transaction as our 50% contribution and lease back the park lands for a very nominal fee.

## PHASES OF DEVELOPMENT AND COSTS

NOTE: Costs based on 1983 price estimates.

Phase I -- IMPROVEMENTS TO EXISTING CENTRAL PICNIC AREA AND ROAD REALIGNMENTS.

| | |
|---|---|
| Road realignment at entrance | $15,000 |
| Realignment of parking lot and access road, landscaping & irrigation | 25,000 |
| New parking lot - 250' x 60' | 15,000 |
| Type IV restroom, drainfield & utilities | 50,000 |
| Dike improvements--redesign and landscape | 35,000 |
| Pond Improvements | 10,000 |
| TOTAL | $150,000 |

Phase II -- PROPOSED GROUP DAY USE AREA.

| | |
|---|---|
| Type IV restroom, drainfield and utilities | $50,000 |
| Electricity & water lines | 20,000 |
| Picnic shelters--2 @ $20,000 ea. | 40,000 |
| Tables, drinking fountains, lawns, landscaping, irrigation | 65,000 |
| Parking--2 lots @ 60' x 300' ea. | 50,000 |
| Playfields--2 | 10,000 |
| Main park drive--1900' @ 22' wide | 33,000 |
| Access roads--1300' @ 16' wide | 17,000 |
| TOTAL | $285,000 |

Phase III -- ONE CAMP LOOP, MAINTENANCE YARD RELOCATION.

| | |
|---|---|
| Campground development (including water, electrical hookups, roads, utility bldg., utilities, landscaping) | $300,000 |
| Entry booth | 5,000 |
| Dump station | 25,000 |
| Main access road--3600' @ 22' wide | 60,000 |
| Maintenance yard (including workshop, office, parking, roads, fuel pumps, utilities) | 100,000 |
| Water System (Including well, pump, reservoir, electrical) | 100,000 |
| Manager's residence and utilities | 75,000 |
| TOTAL | $665,000 |

Phase IV -- BEACH IMPROVEMENTS, FISHING PONDS AND BIKE TRAIL.

| | |
|---|---|
| Main access drive - 5800' @ 22' wide | $100,000 |
| Parking lot @ fishing ponds - 60' x 100' | 10,000 |
| Trails and fishing platforms | 20,000 |
| Parking lots @ beach area - 2 @ 300' x 60' | 50,000 |
| Landscaping, lawns, picnic tables, irrigation | 75,000 |
| Bike trail | |
| Pave only (existing base - railroad right of way) - 10,200 @ 8' wide | 55,000 |
| Install base and pave--6200 @ 8' wide | 110,000 |
| Type IV Restroom | 50,000 |
| Electricity and Water | 20,000 |
| TOTAL | $490,000 |

# Impacts of Park Development

There are few recreational opportunities in the northwest part of Umatilla County similar to those found at Hat Rock.

There are a few small parks in the area, but they consist mostly of access to the Umatilla River, ballfields, picnic areas and some tennis courts.

The only campground in the area is the Hat Rock Campground located at the entrance to the State Park. As explained in the campground development section of this report, we do not anticipate constructing the campground facilities in the State Park until there is a demonstrated need for additional campsites.

During the hot summer months, Lake Wallula is a popular area for recreation and draws many people to the few parks along its shore.

The proposed development at Hat Rock will provide additional facilities for those people who wish to enjoy recreation at or near Lake Wallula.

Consolidation of State Park and Corps of Engineers land will allow for better management of the resource and recreation capabilities, and allow us to provide the best recreation experiences possible.

We do not feel that there is any conflict between the recreational opportunities offered by the State Parks and those offered by the local communities.

# Handicap Accessibility

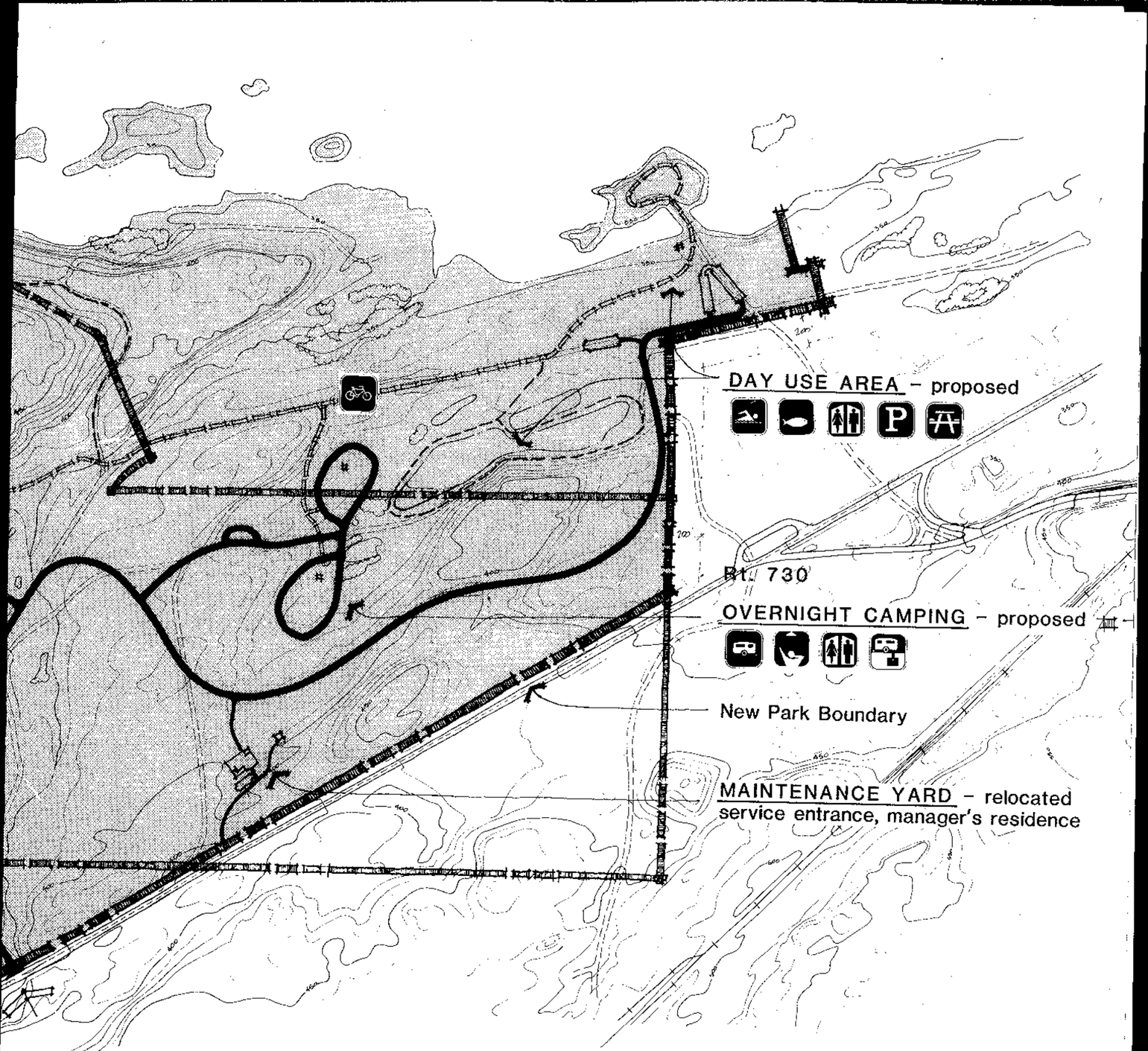
In August of 1978 a study was conducted to determine how accessible Hat Rock State Park is for people with various handicaps. There are no special accommodations made for people with hearing or sight disabilities, but in many cases none are necessary. Special accommodations are required to ensure that all facilities are barrier-free.

Since the report of 1978, a new restroom building has been constructed which is barrier-free, allowing access by those confined to wheelchairs or using walking aids. The building is accessible from the parking lot adjacent to it since a ramp and handrail were installed at the time that the building was constructed.

There are a number of paved trails in the park which are accessible, although some portions of the trails exceed six percent in slope.

The pond is accessible by wheelchair for fishing and the foot bridge is negotiable, although it is rather steep.

Some modifications need to be made to some of the picnic tables and to at least one of the drinking fountains. Some picnic tables need to have one end extended 24" to accommodate a wheelchair and at least one drinking fountain needs to be low enough to be used by a person in a wheelchair.




# DEVELOPMENT PLAN

3.32

## HAT ROCK STATE PARK

UMATILLA COUNTY, OREGON

Date: Revised:

COLUMBIA RIVER (Lake Wallula)

BIKE/HIKE TRAIL – proposed
(to continue to McNary Beach)

DAY USE AREA – existing

DAY USE AREA – existing

improved circulation & new restrooms

Realigned intersection

GROUP DAY USE AREA – proposed

New Park Boundary

Hat Rock

Boat Rock

Rt. 730

0'
0m

| | |
|---|---|
| Maintenance & Operation | 4.01 |
| Maintenance Staff | 4.01 |
| Management Goals | 4.01 |
| Interagency Coordination | 4.02 |
| Natural Resource Management | 4.02 |
| Emergency Procedures Program | 4.03 |
| Pond Management | |
| Weed Control for Working Ponds | 4.04 |
| Pond Bottom Liner Strategy | 4.07 |
| Managing Aquatic Plants | 4.10 |
| Floating Mechicanical Aerators | 4.14 |

# PARK MANAGEMENT 4

## MAINTENANCE AND OPERATION

Hat Rock State Park is a District Park Headquarters park, located in Region 5. The manager and crew are responsible for the maintenance and operation of Hat Rock State Park and the Boardman Rest Area on I-84, 30 miles west of the park.

The park has a complete maintenance service facility with shop, office, garage, gasoline pump and oil storage, and a paved service yard. The Manager's residence is located adjacent to the service yard. The maintenance facilities are centrally located, overlooking the large picnic area in the middle of the park.

The following maintenance facilities have been constructed at the park:

Work Shop - 24'x32', frame, with office, shop & garage
Service Yard - 63'x84', paved
Service Station - 6' 8" x 13' 4", frame, with gas pump and paint locker
Manager's Residence - 44'8"x25'10" frame, with 6 rooms, bath and garage

## MAINTENANCE STAFF

The present staff level at Hat Rock State Park consists of three year-round employees and two seasonal conservation aides for the summer months. The regular staff includes the Park Manager, a Ranger II and a Ranger I. The Ranger I position is normally assigned to the Boardman Rest Area on a full time basis.

## MANAGEMENT GOALS

The key management goals are to improve the recreation quality of the park, maintain conditions favorable to public health and safety, establish good public relations, and achieve the most efficient management.

## INTERAGENCY COORDINATION

An extensive amount of cooperation is involved in the management of this park. The general management of lands here is interrelated with the mixed ownerships and management interests of the U.S. Corps of Engineers and the Bureau of Land Management and those of state agencies, Umatilla County and adjoining private landowners.

Management of the boating activity on the lake comes under state regulations of the State Marine Board with enforcement by the Umatilla County Sheriff's office. Any new proposals involving safety, control, and regulation of boating require coordination through the State Marine Board.

Lake water levels are regulated by the Corps of Engineers. Fishing and Wildlife regulations in this area are handled by the Oregon Department of Fish and Wildlife.

The State Forestry Department in Pendleton and the Umatilla Fire Department provide fire protection. The Oregon State Police and Umatilla County Sheriff provide police protection.

New improvements at the park which would create increased public usage or visitor densities in specific areas require review by the Umatilla County Planning Office. If useage of the park increases to such a degree that more highway directional signage is required, coordination with the Highway Department will be necessary.

Water and sewage projects at the park are coordinated with the state Department of Environmental Quality.

## NATURAL RESOURCE MANAGEMENT

The primary objective in natural resource management is to conserve and retain natural resources whenever possible. Refer to the Site Inventory section of this document for detailed recommendations on each of the natural resource categories.

## EMERGENCY PROCEDURES PROGRAM

Hat Rock State Park has an official Emergency Procedures Program. The document, which is separate from this report, is a description of official procedures followed in case of emergency or other special problems not normally encountered in the daily routine of park operations. The Emergency Procedures Program is periodically reviewed and updated by the park management staff to insure quick, efficient response to emergencies.

The Emergency Procedures Program for Hat Rock State Park 1982 covers the following items.

I. Emergency radio and telephone numbers.

II. Fire

- A. Oregon Fire Rating Index
- B. Fire Emergency Procedure - Park Personnel
- C. Available Fire Equipment
- D. Fire Prevention and Training

III. Emergency Medical Assistance Program

- A. Accident and Dead Body Procedures

IV. Lost Persons

V. Civil Disturbances

VI. Sewer System Failures

VII. Water System Failures

# WEED CONTROL FOR WORKING PONDS: GUARDING FUNCTION AND APPEARANCE

By **Jim Schmidt,** Technical Director, Applied Biochemists, Inc., Mequon, Wisconsin. He is author of the book "How to Identify and Control Water Weeds and Algae."

Ponds play an important role in the functioning of many modern facilities. They serve a variety of uses including cooling of industrial machinery, reservoirs for fire protection, treatment of wastes, and/or retention of storm water.

Consequently, the management of these ponds can be an important consideration in maintaining production, protecting costly equipment, lowering fire insurance rates, complying with effluent standards, or preventing floods. Frequently these ponds serve multiple purposes and must be managed accordingly.

Since many of these water bodies are located adjacent to the plant, their appearance can reflect the environmental consciousness of the company. Visiting customers and the surrounding community often obtain their first impression of an industrial facility based upon its external appearance.

Plant managers or industrial engineers are often the ones responsible for the upkeep and maintenance of these ponds. Unfortunately, many of the problems which confront them are of a biological nature, an area outside their training and expertise. While familiar with the mechanics such as flow rates, pump capacities, retention times, etc., when faced with nuisance aquatic weed and algae growth they are at a loss for solutions.

The very nature and uses of many industrial waters increase their potential for having nuisance vegetation problems. Cooling ponds often maintain relatively high water temperatures (60°F-90°F) year round. Aquatic plants, like terrestrial vegetation, respond to these warmer temperatures by growing faster and more persistently throughout the year.

Storm water retention ponds fed by runoff, sewage treatment lagoons, and ponds located in fertilized, landscaped areas receive high levels of nutrients (nitrogen and phosphorus) which enhance aquatic growth. Both warm water and high nutrient concentrations contribute to aquatic vegetation problems.

Mechanical rather than chemical solutions are often sought since most engineers are more

**Practical functions** of ponds include irrigation and drainage retention as in the case of this pond. These functions require extra management attention.

4.04

**Herbicides for Pond Weed Management**

| Trade Name | Target Weeds | Precautions | Manufacturer |
|---|---|---|---|
| Algimycin (chelated copper) | Algae | Use when water is above 60 degrees F. | Great Lakes Biochemical |
| Amitrole | Waterhyacinth, cattails | Not for irrigation or drinking water. | Union Carbide |
| Aqua-Kleen (2,4-D) | Bladderwort, coontail, waterchestnut, watermilfoil, waterstargrass, waterlilly. | Not for irrigation or drinking water. | Union Carbide |
| Aquashade | Algae, submersed weeds, brittle naiad, pondweed. | Apply late winter, early spring. | Aquashade |
| Aquathol | Bassweed, coontail, watermilfoil, naiad, pondweed. | Not for irrigation within 7 days. | Pennwalt |
| Aquazine | Algae and many weeds. | See label. | Ciba Geigy |
| Banvel-720 | Waterhyacinth, alligatorweed, arrowhead, water pennywort, smartweed, cattail. | Some state labels, only. | Velsicol Chemical Corp. |
| Casoron G-10 | Elodea, naiad, watermilfoil, coontail, pondweeds. | Not for irrigation or drinking water. Preemergence. | Thompson-Hayward |
| Cutrine-Plus | Algae, Chara. | With granular treat pond in portions. | Applied Biochemists |
| Diquat | Bladderwort, coontail, elodea, naiad, pondweeds, watermilfoil, pennywort, duckweed. | Ten day wait needed before pond can be used for swimming, irrigation, drinking. | Ortho Div., Chevron |
| Hydrothol | Algae, Chara. | Fourteen day wait for irrigation or domestic uses. Treat only portions of pond at one time. | Pennwalt |
| K-Lox | Hydrilla, algae. | Apply on sunny day for actively growing hydrilla. | Sandoz |
| Vegatrol LV 4-D | Watermilfoil, water lilies, coontail. | Not for irrigation ponds. | Velsicol Chemical Corp. |
| Weedtrine II | Selected submerged and emergent plants. | Not for irrigation ponds. | Applied Biochemists |

Applied Biochemists, 5300 W. County Line Rd., Mequon, WI 53092. 1-800-558-5106.
•Aquashade Inc., PO Box 198, Eldred, NY 12732. 914-557-8077.
Ciba Geigy Corp., PO Box 11422, Greensboro, NC 27409. 919-292-7100.
Great Lakes Biochemical, 6120 W. Douglas Ave., Milwaukee, WI 53218. 414-464-1200.
Ortho Div., Chevron, 575 Market St., San Francisco, CA 94105. 415-894-3760.
Pennwalt Corp., 1630 E. Shaw, Fresno, CA 93710. 209-226-8400.
Sandoz Inc., 480 Camino Del Rio, San Diego, CA 92108.
Thompson-Hayward, 5200 Speaker Rd., Kansas City, KS 66110.
Union Carbide, 7825 Bay Meadows Way, Jacksonville, FL 32216.
Velsicol Chemical Corp., 341 E. Ohio St., Chicago, IL 60611.

familiar with equipment. Screens, filters or aerators are installed in an attempt to solve problems. When chemicals are used, they are frequently of the wrong type. Biocides containing quaternary ammonium chloride compounds, chlorine, and copper sulfate are initially introduced due to their availability and the engineer's familiarity with them. Understandably, results are often poor. These chemicals are not specifically designed to control the plants present and they might not be compatible with the water quality in the pond.

It is important to note that there are specific aquatic herbicides and algaecides which are registered with the Federal Environmental Protection Agency for use in ponds.

The combination of algaecides and herbicides applied as a tank mix have shown promise through enhanced effectiveness. Specific recommendations on tank mix uses are available from manufacturers.

Several considerations must go into planning and implementing an aquatic nuisance control program. Before purchasing and applying anything, it is first necessary to identify the problem plants. State natural resource agents, university biologists, or Soil Conservation Service agents can usually be called upon for this.

Water volume or surface area and depth must be determined to calculate the amount of material required. Generally, aquatic chemical application rates are given in terms of gallons or pounds per surface acre (43,560 square feet) or acre-foot (326,000 gallons). Sometimes, parts per million (ppm) recommendations are given. One ppm is equivalent to 2.73 pounds of material in one acre-foot of water.

Flow, evaporation, or dilution with make-up water can affect results if they are not compensated for in the application. It is necessary that sufficient contact time between toxic concentrations of the herbicide and target plants be maintained for several hours. Granular formulations

*...s on page 58*

4.05

**Weed Control** *from page 33*

or metering (drip) systems are sometimes used in flowing water situations or to treat make-up water which is entering the pond. Recirculating pumps can sometimes be shut down during treatment and kept off for several hours. Ponds fed by significant amounts of runoff should not be treated when heavy rains threaten.

While most aquatic pesticides are compatible with a wide range of water qualities, certain conditions can neutralize them. Some herbicides should not be used in muddy waters since the active ingredient becomes deactivated (i.e. Diquat). Similarly, copper sulfate applied for algae control in hard water precipitates out of solution too quickly to be effective. Chelated copper may be used to insure proper contact time.

Corrosion can be of some concern, particularly when the pond water is recirculated through or around expensive equipment. Generally, chemical concentrations after application are too low to cause any problems. High dosage of copper sulfate or poor distribution of products, however, could cause damage.

Effluent standards, particularly in sewage treatment or retention ponds, must be met if they flow into nearby waterways. Familiarity with state guidelines and permits is of utmost importance. For example, the suspended solids content might exceed state requirements due to abundance of planktonic algae. A remedial action would be to apply a copper algaecide. It must be insured, however, that the copper concentration does not exceed effluent standards for copper.

Equipment used for applying aquatic pesticides will vary depending upon the size of the area to be treated and the formulation being used. Granular materials are often spread with a hand scoop or mechanical spreader. Power sprayers with 1 to 5-hp engines are useful in areas exceeding one acre. Hand or backpack orchard sprayers facilitate treatment of small water bodies. Metering in of chemical with drip systems is effective where compensation for water flow or exchange must be considered.

Frequency of chemical application will vary with each situation. In temperate climates, a single herbicide treatment followed by two or three algaecide applications will keep vegetation under control during the warmer months. In warmer regions, more frequent applications might be necessary. Chemicals are best applied before growth gets out of hand and when water temperatures are above 60°F. Periodic examination of the pond will help in developing the proper maintenance schedule.

Regardless of the product being used, the applicator should familiarize himself with the label to insure proper handling, application, and dosage of the material. Knowledge of applicable state laws, permits, and licensing should be obtained and complied with as well. **WTT**

# POND BOTTOM LINER STRATEGY IS MORE THAN A COVERUP

By **Douglas Pullman,** Aquatic Biologist, Dow Gardens, Midland, Michigan, and John Craig, Department of Fisheries and Wildlife, Michigan State University, East Lansing

Ornamental ponds are a common landscape feature of many midwestern arboretums, horticultural display gardens, golf courses, and housing subdivisions. These ponds are usually small, with areas less than 10 acres and depths rarely greater than 18 feet. The primary purpose of an ornamental pond is to enhance and highlight the beauty of the surrounding landscape. Occasionally, the ornamental pond is by itself an outstanding landscape feature. Secondary uses include fishing, swimming, and irrigation water supply.

Ornamental ponds are not merely holes in the ground that fill with water. To be an asset to a landscape, the ponds usually require intensive management efforts. Infestations of rooted and floating aquatic plants and blooms of various forms of algae have rendered many an ornamental pond a liability rather than an asset. The causes of excessive aquatic plant growth are surprisingly few. Excessive inputs of plant nutrients, inappropriate fish stocking, and the introduction of exotic plant species are the underlying causes for the decline of most ornamental ponds. Some aquatic systems management strategies deal directly with the underlying problems in ornamental ponds, but most are symptomatic cures. Management techniques used in ornamental pond management include watershed manipulations designed to limit nutrient inputs and sediment loading, deep dredging, piscicide applications, quarantining, harvesting, chemical herbicide applications, water dyes, bottom liners, flushing, water level control, raking, shallow dredging, drawdown, introduction and management of desirable plant and animal species.

Benthic semi-barriers are a recent addition to the arsenal of techniques used to control aquatic plant infestations. These barriers resemble large sheets of fiberglass windowscreen and are laid over the top of aquatic plant beds to control the plant growth beneath them. Perkins et. al. (1980) reported that a benthic semi-barrier, Aquascreen (manufactured by Menardi-Southern, Houston, Texas), was an effective control for Eurasian Watermilfoil *(Myriophyllum spicatum L.)* in Union Bay at the outlet of Lake Washington, Seattle, Washington. Mayer (1978) reported similar results for the control of various aquatic plant species in Lake Chautauqua, New York.

The pond located in the Dow Gardens, Midland, Michigan, is a 3.5-acre shallow water (mean depth less than four feet) ornamental pond. The primary function of the pond is one of aesthetics and secondary function is to supply irrigation water to the terrestrial gardens. Aquatic herbicides are rarely used in the pond because of its irrigation function. The pond system is infested with *Elodea canadensis* Michx. During the summer of 1979, Aquascreen was placed over a luxuriant bed of elodea. An attempt was made to fasten the screen to the pond bottom with stakes and brick weights, but these efforts were largely unsuccessful due to the

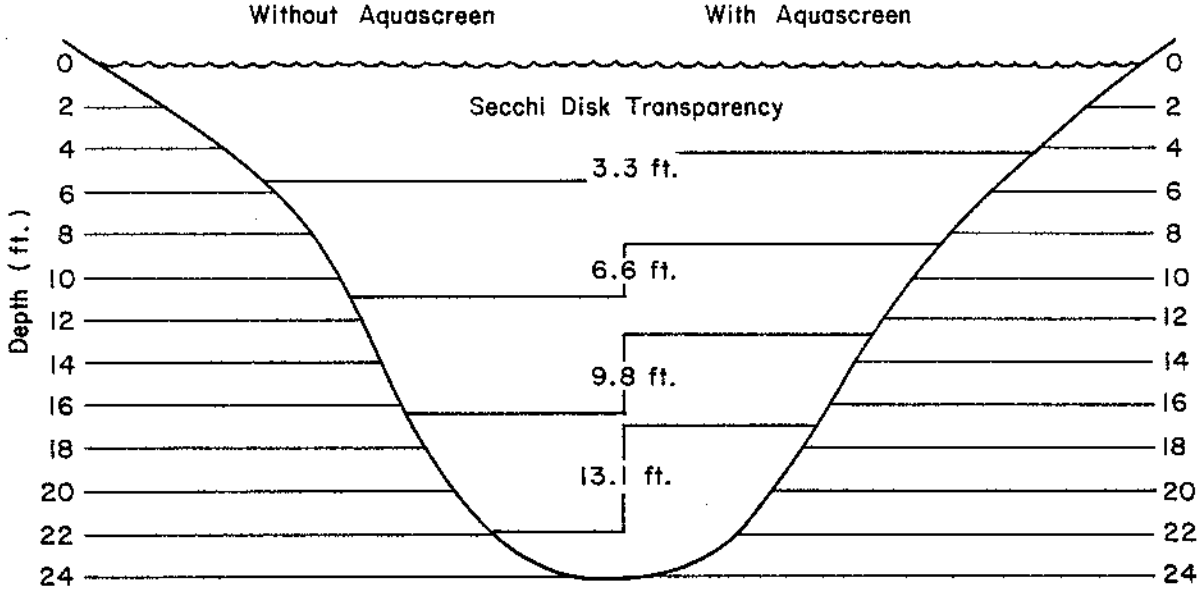
**Aquascreen** laid over vigorous Elodea in shallow pond failed to control by shading or compression. Elodea is moderately shade tolerant.

*Continues on page 38*

4.07

**Coverup** *from page 36*

dense and rigid structure of the plant community. Despite this problem, the Aquascreen was left in place to see if plant control would come about by shading out the elodea beneath the screen. The elodea, growing beneath the Aquascreen, did not decline in vigor, however. Complaints concerning the appearance of the test site led to the removal of the Aquascreen




**Comparison of the maximum depths** that *Elodea canadensis* can grow without being limited by too little light under natural conditions and under Aquascreen given four different Secchi disc transparancies.

four weeks after it was applied. It appeared that the light attenuation was not great enough to control aquatic plant growth in shallow water.

### Light Limitation

An investigation of the percent light attenuation caused by Aquascreen was conducted with a Li-Cor LI-188 Quantum/Radiometer/Photometer. Measurements were made in air and at various water depths. Our findings agreed with other researchers (Perkins et. al., 1979; Mayer, 1978) that Aquascreen attenuated light penetration by roughly 60%.

The depth to which light can penetrate through a column of water is a function of scattering and absorption by the water and dissolved and suspended substances in the water. A standard measure of transparency (depth of light penetration) in a pond or lake is made with a 7.9-inch (20 cm.) diameter white disc called a Secchi disc. These discs can be purchased from many scientific supply companies or can be easily constructed from a variety of common materials. A Secchi disc is lowered into the water on a line, cord, or chain to the depth where it just disappears as viewed from the water surface and then raised again to the depth where it reappears. The mean of these two depths is the Secchi disc transparency value for that pond or lake. The greater the depth where the disc finally disappears, the more transparent the water.

The maximum depth at which rooted, submersed plants can grow in typical ornamental ponds is determined by many factors but chief among these is water transparency. Secchi disc transparency roughly estimates a depth that is a certain fraction of the depth where light is so attenuated by absorption and scattering that it is not adequate to allow plant growth. This maximum depth varies from species to species, ranging from where 2% to 10% of the light that falls on the surface still remains. Like terrestrial plants, some aquatic plants are more shade tolerant than others. Elodea is a relatively shade tolerant species. Data suggest that it can grow where only 4.5% of surface light still remains (Hutchinson, 1975). Figure 1. shows graphically the maximum depth that elodea can grow, given different water transparencies with and without Aquascreen. Above the data lines light is sufficient for elodea to grow, but it would not grow at greater depths due to light limitation. It is obvious from this figure that Aquascreen does not shade

*Continues on page 51*

**Coverup** *from page 39*

elodea adequately in shallow waters to make it a viable control mechanism if light attenuation were its only mode of control.

### Compression and Space Limitation

It appears that the principal mode of aquatic plant control affected by Aquascreen is compression and space limitation. It would also appear to be impractical to attempt this sort of control for a dense, rigid, and compact mature stand of elodea. Aquascreen does, however, show promise as a preventative or re-infestation control of elodea in an area that has been previously cleared of vegetation by raking, cutting, shallow dredging, or herbicide application. This was tested in the Dow Gardens pond system during the summer of 1980.

On May 7, 1980, four 5x5-foot sheets of Aquascreen were placed randomly in a shallow water area that had just been raked free of vegetation. Two 5x5-foot plots were chosen as controls. All the vegetation from the six plots was harvested on August 8, 1980 and ash-free dry weights were determined for subsamples.

Elodea grew beneath the Aquascreen and appeared to be vigorous but did not displace the screens upward in an unsightly fashion. Aquascreen was indeed quite effective in controlling the growth of elodea when applied in this manner. The plant biomass growing beneath and through Aquascreen was only 3% of that found in the control plots measured as ash-free dry weight per square foot.

Elodea growing adjacent to the treatment plots tended to overgrow the edges of the screens, but none of the treatment plots were completely covered by the encroaching plants. This year we will treat a much larger area with Aquascreen to evaluate the extent of adjacent plant encroachment over the treatment area and its impact on the efficacy of Aquascreen as an aquatic plant control tactic.

Aquascreen appears to have a great potential for the control of rooted, submersed aquatic plants in shallow ornamental ponds, as long as good pond bottom contact is made. Luxuriant, rigid, and dense plant communities, such as those formed by elodea, may have to be removed mechanically or with herbicides prior to the application of Aquascreen so that proper bottom contact can be made. Bottom contact is also essential so that the treatment will not be aesthetically objectionable. Although the light attenuation effect caused by Aquascreen is not adequate to be a viable control strategy in typical shallow ornamental ponds, the compression and space limitation effects caused by Aquascreen integrate well into ornamental pond management planning and technology.

# MANAGING AQUATIC PLANTS IN SMALL LAKES AND PONDS

Small lakes and ponds make attractive additions to parks, golf courses, commercial landscapes, and private estates. However, it is the role of nature to fill in a body of water with time. Proper maintenance and construction can slow down the process.

Natural lakes through siltation become shallower and thus better growing sites for aquatic weeds. Fertilization of watershed areas for whatever reason encourages growth of vegetation in lakes and ponds. Seepage from sewage treatment systems serves to feed aquatic vegetation. Or perhaps, man has simply entered an area where aquatic vegetation was already established and he wants to eliminate it from his property.

Whatever the cause, any aquatic weed problem cannot be solved without investigation of all the reasons why a small lake or pond has an overabundance of weeds.

**Construction**

More than seven million acres of lakes have been constructed on U.S. farms alone. Most of these were constructed under U.S. Department of Agriculture Soil Conservation guidelines. Owners of privately constructed lakes may not have had the benefit of knowledge available to the farmers.

The following points should be considered when building a small lake or altering an existing lake:

—depths less than three ft. should be avoided. Eight to ten ft. is satisfactory for a small lake.

—for each acre of lake surface there should be approximately 15 acres of watershed if the lake is not stream-fed.

—lakes much smaller than one acre do not provide good natural conditions for fish.

—a spillway should be built to control overflow during heavy rains. Lakes with more than 20 acres of watershed per acre of lake surface should have a cement or stone spillway.

—the lake should not be surrounded by tall trees which shade the water surface. Trees should not be planted close to the shore since roots may encourage erosion.

—measures should be taken to prevent wave erosion for lakes in windy locations.

—sand should not be used heavily for lake beaches since it will quickly drift to the bottom causing depth problems.

—loose soil should be avoided in the watershed area to avoid rapid siltation. Siltation should not exceed one percent of the original depth of the lake in one year.

—if there are a number of lakes fed from one stream, it is preferable to branch each lake off the stream, rather than to have one lake feeding into another.

—good air circulation above the lake is needed to mix upper and lower water levels if the lake is not stream-fed.

—aquatic vegetation produces oxygen during photosynthesis and is therefore necessary for good fish production. It also serves to stabilize bottom sediment.

—the lake bottom should be watertight to the degree that serious drops in water level are not experienced in dry weather. Periodic checks for damage by burrowing animals is advisable.

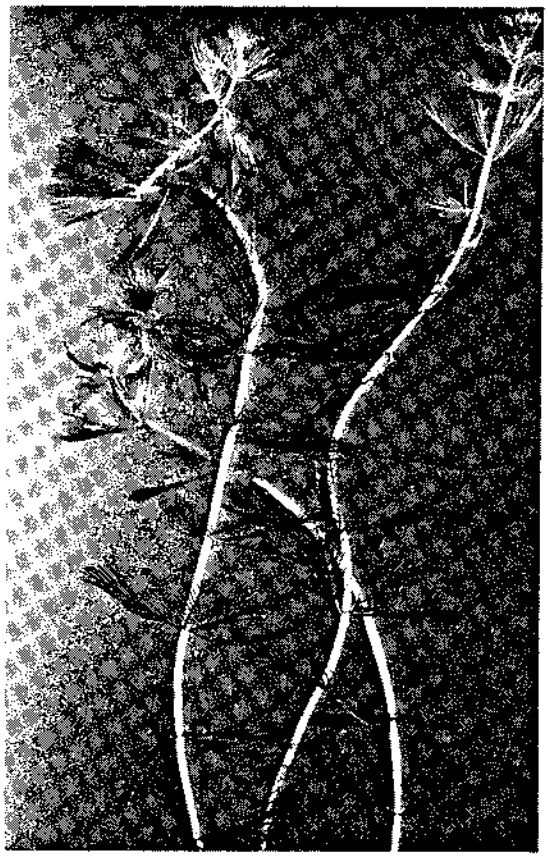
Oxygen content is a crucial factor in lake management. Water holds less dissolved oxygen as it gets warmer. Spring water, although cold, does not carry much oxygen since it has not been exposed to the air. The oxygen content in a lake drops in the summer, especially at lower depths.

A phenomenon called stratification also can occur in the summer. Stratification is the separation of the water into definite layers caused by differences in density as a result of temperature differences. The warmer, less dense, surface layer does not mix with the colder and denser lower layers. Consequently, oxygen does not reach the lower depths of the lake.

Oxygen depletion can also be caused by decay (oxidation) of organic matter in the water. Sewage or organic effluent from livestock can cause severe reduction in oxygen content of the water. Also, lakes near swamps may suffer from an excess of organic matter.

Fish, cold-blooded animals, experience increased respiration as the temperature of the water rises. Consequently, fish use up more oxygen in warmer water. If fish begin to swim at the surface of the lake a serious oxygen problem exists.

Winter presents oxygen problems as well. A thick, snow-covered layer of ice over a lake not



**Infestations of aquatic weeds** can cause serious drops in land value (far left). Specimen of the submersed watermilfoil (left). The white amur is an exotic species of carp which has great promise for small lake weed control.

only seals out air from the water, but shades the plants under the ice and stops their photosynthesis and oxygen production.

Bubblers and other devises to keep the water layers mixed are available. They can reduce the chance of stratification in the summer and prevent total ice coverage in the winter. Kembro, Inc. makes such a unit.

A small lake should have a natural balance insured by proper maintenance and construction. If it gets out of balance, then the need for a variety of methods to achieve control over aquatic vegetation is evident.

### Types of Aquatic Vegetation

Four types of aquatic vegetation are of primary concern in weed control; algae, submergent weeds, emergent weeds, and floating weeds.

Algae are small plant organisms that, when abundant, or in bloom, create an unsightly, smelly, and damaging problem. Algae can clog water filters, irrigation systems, and other machinery. Algal blooms can shade out submerged plants or deplete oxygen dangerously from nighttime respiration. Massive kill-off of other aquatic vegetation can create tremendous amounts of decaying material in a body of water and rob it of its oxygen content. Certain forms of algae are toxic to animals and serve to transmit fish diseases and parasitic infections.

Submergent weeds are rooted in the lake bottom and are totally under water.

Emergent weeds grow in shallow areas with stems and leaves usually out of water.

Floating weeds are either free-floating or bottom-rooted plants which have leaves that float on the water's surface.

Overabundance of any of these plants can interfere with the recreational uses of a lake, speed up the rate of siltation, clog irrigation and drainage systems, cause unpleasant odors, impart a bad taste to the water, crowd out wildlife, and reduce the value of property the lake is on.

### Control Measures

Prevention is the first method of aquatic weed control. Regular observation and maintenance of the lake is as critical as any other form of vegetation management. A healthy balance of the aquatic environment should reduce the need for artificial control measures, except for swampy areas where man has entered.

When the lake environment gets out of balance, effective mechanical, biological and chemical means to control weeds are available. Each has particular advantages and disadvantages. In the case of small lakes and ponds, control techniques designed primarily for large lakes are not practical. Attention should be paid not to create a large amount of dead and decaying vegetation in the lake at any one time.

Chemical control of algae is most practical. Application rates should be closely figured and adhered to to avoid any danger to fish. Copper-based compounds, especially in pelleted form, are very useful and are available from a number of manufacturers: 3M Co., Great Lakes Biochemical

**Submersed Weeds**

Pondweed
Hydrilla
Buttercup
Cabomba
Coontail
Watermilfoil
Slender naiad
American Elodea
Bladderwort

**Emergent Weeds**

Arrowhead
Bullrush
Cattails
Water primrose
Alligator Weed
Water willow
Smartweed

**Floating Weeds**

Duckweed
Water Pennywort
Water Lily
Water Lettuce
Salvinia
Water Hyacinth

*Hydrilla*

Co., Phelps Dodge Refining Corp., Applied Biochemists Inc., and Thompson-Hayward Chemical Co. (See list for addresses.)

Other chemicals for algae control are Aquazine from Ciba Giegy Corp., Diquat from Ortho Div. of Chevron Chemical Co., and Aquathol K from the Agchem Div. of Pennwalt.

Higher aquatic plants are hardier than algae and control is consequently more difficult. The first alternative is to cut and remove them mechanically. This could be done by hand for small areas. Larger jobs may require harvesters that cut swaths of weeds from pontoon-like platforms. Aquamarine Corp., and Air-Lec Industries, Inc. manufacture such devices. Harvested weeds should be removed from the lake and disposed of away from the watershed area. Dredging, burning, and lowering the water level for winter are a few other methods of mechanical control.

Although a number of biological control methods have been tried, the white amur, a species of carp imported from China appears to have the most promise for small lake weed control. The fish is outlawed in most states at the present time, but research by Sutton at the University of Florida may help legalize the fish in more states.

Sea-Ranch Inc. produces white amur commercially. The fish are legal in the states of Arkansas, Florida, Mississippi, and Alabama. The amur con-

sumes large amounts of aquatic vegetation and does not reproduce successfully in the U.S.

Other natural consumers of aquatic vegetation are crayfish, ducks and geese, other types of fish, snails, and insects.

Chemicals for higher aquatic weeds are applied to the lake bottom after the water level has been drawn down, as granules that sink to the lake bottom, as liquid spray onto the surface, or as a foliar spray. Most chemicals require swimming restriction for a period of time after application. Also, if lake water is used for irrigation, there may be restrictions on use for irrigation. If this is the case, treatment should be avoided in the summer when the demand for irrigation water is greatest.

For submerged weeds the following chemicals are available: Aquazine by Ciba Geigy Corp.; Aquathol and Hydrothol by Pennwalt; Diquat by Ortho Div. of Chevron Chemical Co.; Casoron by Thompson-Hayward; Fenac and 2,4-D by Amchem Products, Inc.; and Systems E and L by 3M.

For emergent weeds the following products are available: Diquat; Dalapon by Dow; Casoron; Weedtrine-D by Applied Biochemists Inc.; and 2,4-D products from Amchem.

For floating weeds there is Aquathol and Diquat.

It is extremely important to read the label of any product and to ask for full information about products from dealers.

Dosages are in pounds per acre-foot. Acre feet are derived by multiplying the surface area of the lake in acres by the average depth in feet. The dealer will also help you make these calculations.

Aquatic weed control is not a simple matter. There are many considerations to be made and questions to ask before going ahead with a weed control program. **WTT**

**Manufacturers of Aquatic Weed Control Products**

Air-Lec Industries, Inc., 3306 Commercial Ave., Madison, Wi. 53714.
Amchem Products Inc., Brookside Ave., Ambler, Pa. 19002
Applied Biochemists, Inc., 5300 W. County Line Rd., Mequon, Wi. 53092
Aquamarine Corp., 225 N. Grand Ave., Waukesha, Wi. 53186
Chevron Chemical Co., Ortho Div., 575 Market St., P.O. Box 3744, San Francisco, Ca. 94105
Ciba Geigy Corp., P.O. Box 11422, Greensboro, NC 27409
Dow Chemical Corp. P.O. Box 1706, Midland, Mi. 48640
Great Lakes Biochemical, 6120 W. Douglas, Milwaukee, Wi. 53218
Kembro, Box 205, Mequon, Wi. 53092
Pennwalt Corp., 1630 E. Shaw Ave., Fresno, Ca. 93710
Sea-Ranch Inc., Rt. 2, Box 604, Sheridan, Ark. 72150
Thompson-Hayward Chemical Co., 5200 Speaker Rd., Kansas City, Ks. 66110
3M Co., 3M Center, St. Paul, Minn. 55101.

**Now available with Fountain-Glo lights and in two elegant spray sculpture styles that help enhance the natural beauty of any surrounding**

# TECHNICAL DATA

| MODEL | HP | PHASE | VOLTAGE | AMPS* | MAX CABLE | SPRAY HT. (FT.) | SPRAY DIA. (FT.) | PUMPING RATE GPM | CIRC. RATE GPM | SHIPPING WGT. |
|---|---|---|---|---|---|---|---|---|---|---|
| STARBURST | | | | | | | | | | |
| 200 | 2 | 1 | 230 | 11.5 | 200 | 4 | 20 | 1180 | 5900 | 120 |
| 300 | 3 | 3 | 230 | 9 | 300 | 5 | 26 | 1500 | 7500 | 130 |
| | | | 460 | 4.5 | 1500 | 5 | 26 | 1500 | 7500 | 130 |
| 500 | 5 | 3 | 230 | 14 | 250 | 6 | 32 | 2000 | 10000 | 145 |
| | | | 460 | 7 | 1000 | 6 | 32 | 2000 | 10000 | 145 |
| ROCKET | | | | | | | | | | |
| 200 | 2 | 1 | 230 | 11.5 | 200 | 12-14 | 4 | 590 | N/A | 120 |
| 300 | 3 | 3 | 230 | 9 | 300 | 16-18 | 4 | 750 | N/A | 130 |
| | | | 460 | 4.5 | 1500 | 16-18 | 4 | 750 | N/A | 130 |
| 500 | 5 | 3 | 230 | 14 | 250 | 20-22 | 4 | 1000 | N/A | 145 |
| | | | 460 | 7 | 1000 | 20-22 | 4 | 1000 | N/A | 145 |

# Selection and Application: Golf C

## Golf Course and Park Applications

Otterbine industrial aerators maintain high water quality in golf courses and park ponds and lakes, Figures 1 and 2. The benefits are many.

**Cleaner-Looking Water.** With adequate oxygenation and mixing, fertilizer runoff and other organic wastes in the water are biodegraded naturally and more efficiently, making the water look cleaner.

**Reduced Odors.** Because organic wastes are more thoroughly biodegraded, unpleasant odors caused by organic wastes are reduced or eliminated. The water not only looks cleaner — it smells cleaner.

**Fewer Algal Blooms.** Unsightly algal blooms are kept under better control without chemicals, eliminating the cost and environmental hazards of chemical treatments.

**Cleaner Irrigation Water.** If the water is used for irrigation, the naturally cleaner water may be better for the turf. And there's less chance that irrigation equipment will be clogged by algae or that foul-smelling water will be applied to the turf.

**Reduced Sludge Buildup.** Buildup of bottom sludges is reduced. And conditions are thus made less favorable for the growth of excessive amounts of rooted aquatic weeds.

**More Effective Weed Control.** Otterbine industrial aerators are good tools to use in conjunction with biological control programs for rotted and floating aquatic weeds. If, for example, herbivorous fish are used for biological weed control, oxygenating and mixing the water helps benefit the fish and helps to biodegrade fish wastes that could otherwise reduce water quality and build up as bottom sludges that encourage rooted weed growth.

**Sparkling Beauty.** The sparkling spray displays created by Otterbine industrial aerators are so attractive that these versatile "floating fountains" are sometimes installed solely for pond and lake beautification. The spray displays also serve as highly visible reminders that a golf club, park or resort has an ongoing program to improve water quality naturally.

**Benefits Environment.** Use of Otterbine industrial aerators is highly acceptable to environmentalists, sports-people, government officials and others who are deeply concerned with water quality and are opposed to treatment with toxic chemicals.

**Soothing Sound.** Many people find the gentle waterfall sound created by Otterbine industrial aerators pleasantly soothing and appropriate to pond, lake and stream settings.

## Providing Sufficient Capacity

A generally useful guideline to follow for effective water quality control in golf course and park ponds and lakes is to install one horsepower of Otterbine industrial aerator capacity for each surface acre of water. Increase this to 1 1/2 horsepower per surface acre if the quality of the water is especially poor.

For large or irregularly shaped ponds and lakes, it's generally better to install several lower-horsepower Otterbine industrial aerators, spaced well apart than to install a single high-horsepower aerator. This helps to provide more uniform water quality throughout the pond or lake.

Your Otterbine dealer can help you develop a water quality improvement plan for your golf course or park pond or lake. Factory application engineering services are also available through your Otterbine dealer.

Golf courses are big u
industrial aerators. Th
objectional water odor
blooms under control,
cleaning up the water.

## Streams and Canals

Otterbine industrial aerators can be a big help when it's necessary to improve water quality in flowing streams and canals with either flowing or still water.

**More Dissolved Oxygen.** They help to increase dissolved oxygen concentrations, thus making fish kills from lack of dissolved oxygen less likely.

**Cleaner Water, Reduced Odors.** Otterbine industrial aerators help to biodegrade organic pollutants in the water, thus helping to make the water look and smell cleaner.

**Don't Interfere With Navigation.** Because of their compact size, Otterbine industrial aerators can usually be located so they will not interfere with navigation. They can easily be moved if desired.

The sparkling spray displays created by Otterb
Three displays are available: Regular, Starburs

## Architectural Applications

Otterbine industrial aerators are often specified by architects for ornamental applications. Figure 3.

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The
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# rse, Parks, Architectural Settings

Otterbine
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**Attractive Spray.** The "spray sculptures" produced by Otterbine industrial aerators fit in well with — and enhance the beauty of — many architectural settings.

**No Plumbing.** These "floating fountains" are easy and economical to install, and require no foundations, and no external pumps, filters, piping, drains or other plumbing. They can easily be removed from the water for service.

**Better Water Quality.** When installed for esthetic appeal, Otterbine industrial aerators offer water quality improvement at no extra cost.

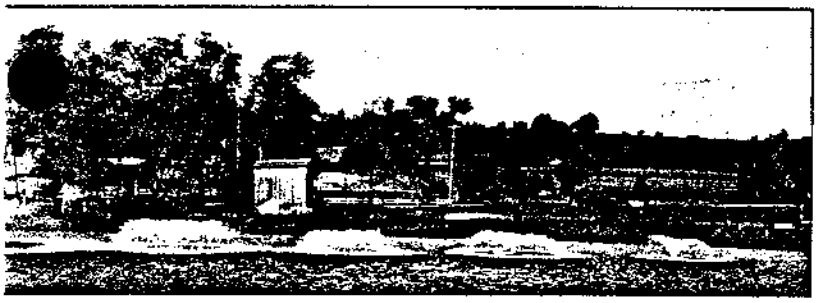
The spray height and diameter information given in Table 1 will assist your architect in specifying the right "spray sculpture" size for your application. Also see Figure 2 for a view of the appearance of the spray patterns produced by all sizes of Otterbine industrial aerators.

## Helps Prevent Ice

Cold Weather Operation: The Otterbine aerator has been specially designed to operate at below freezing temperatures. Otterbines are designed with a submerged motor and float assembly. An additional (optional) circulator cap assembly is used in below freezing temperature. The cap restricts the pumping action and forces the warmer bottom water to the surface thus helping to eliminate ice. Care should be exercised in using the aerator in below freezing temperature without the circulator cap assembly.

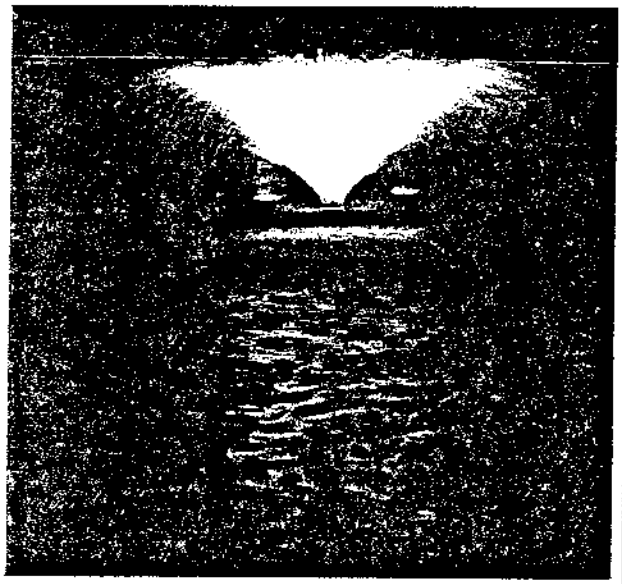
## Otterbine Accessories

Fountain-Glo™ lights are now available in several colors and with automatic timers. This low voltage system with an all PVC housing provides safety and operates economically. The unique bracket design makes the unit easy to install.



ıdustrial aerators enhance the natural beauty of golf course, park and resort ponds and lakes. Rocket.

erator helps



Bathe your Otterbine fountain in the soft glo of light for pennies a night.

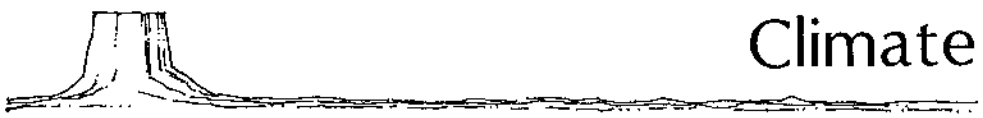
## Technical Data

| MODEL | HP | VOLTAGE | AMPS* | SPRAY HT. (FT.) | SPRAY DIA. (FT.) | PUMPING RATE GPM | CIRC. RATE GPM |
|---|---|---|---|---|---|---|---|
| LSS 100 | 1/20 | 115 | 0.7 | 8" | 2 | 60 | 300 |
| LSS 350 | 1/3 | 115 | 7 | 3 | 8 | 185 | 925 |
| | | 230 | 3.8 | 3 | 8 | 185 | 925 |
| STANDARD | | | | | | | |
| 1S | 1 | 115 | 13.4 | 2.5 | 12 | 625 | 3125 |
| | | 230 | 6.7 | 2.5 | 12 | 625 | 3125 |
| 2S | 2 | 115 | 23 | 3 | 14 | 1180 | 5900 |
| | | 230 | 11.5 | 3 | 14 | 1180 | 5900 |
| 3S | 3 | 230 | 9 | 4 | 20.5 | 1500 | 7500 |
| | | 460 | 4.5 | 4 | 20.5 | 1500 | 7500 |
| 5S | 5 | 230 | 14 | 5 | 28 | 2000 | 10000 |
| | | 460 | 7 | 5 | 28 | 2000 | 10000 |
| STARBURST | | | | | | | |
| 200 | 2 | 230 | 11.5 | 4 | 20 | 1180 | 5900 |
| 300 | 3 | 230 | 9 | 5 | 26 | 1500 | 7500 |
| | | 460 | 4.5 | 5 | 26 | 1500 | 7500 |
| 500 | 5 | 230 | 14 | 6 | 32 | 2000 | 10000 |
| | | 460 | 7 | 6 | 32 | 2000 | 10000 |
| ROCKET | | | | | | | |
| 200 | 2 | 230 | 11.5 | 12-14 | 4 | 590 | N/A |
| 300 | 3 | 230 | 9 | 16-18 | 4 | 750 | N/A |
| | | 460 | 4.5 | 16-18 | 4 | 750 | N/A |
| 500 | 5 | 230 | 14 | 20-22 | 4 | 1000 | N/A |
| | | 460 | 7 | 20-22 | 4 | 1000 | N/A |

*2 hp. and lower are single phase

| | |
|---|---|
| Climate | 5.01 |
| Scenic Qualities | 5.08 |
| History | 5.13 |
| Wildlife | 5.29 |
| Vegetation | 5.49 |
| Land Forms | 5.73 |
| Water Features | 5.77 |
| Soils | 5.85 |
| Geology | 5.96 |

# SITE INVENTORY 5



# Climate

# Climate

## PRECIPITATION

The northeast section of Oregon is one of the warmest and driest areas in the State. The climate here is temperate and semi-arid. Precipitation is generally light throughout the year with practically no rainfall occuring during the months of July and August. Annual precipitation is only about 8 inches. Rainfall or snow are most likely to occur from November through February.

## TEMPERATURES

Mean daily temperatures range from about 32 F in January to 74 F in July. Mean maximum temperatures in July are a very warm 92 F, while the mean minimum temperatures in January are 23 F. Temperatures along the river are generally cooler during the summer than temperatures farther inland, making the parks on the Columbia River very popular spots.

## WINDS

In addition to the heat of summer and the lack of precipitation, strong winds are also common. Since the winds are influenced by the Columbia Gorge, they tend to be parallel to the river. During the summer the winds frequently flow upriver, and during the winter the cold air of the interior often flows down river. Prevailing winds are from the southwest during all months except September, November and December when they are from the west.

The winds contribute to the high rate of evaporation and are also a principle cause of soil erosion here. Dust storms are not uncommon, reducing visibility and carrying soil for miles.

SOURCES:

Natural Vegetation of Oregon and Washington, Franklin and Dyrness, USDA General Technical Report PNW-8, 1975.

USDA Report on Water and Related Land Resources: Umatilla Drainage Basin, SCS, Dec. 1962.

McNary Draft Master Plan, Design Memorandum No. 24, U.S. Corps of Engineers, December, 1981.

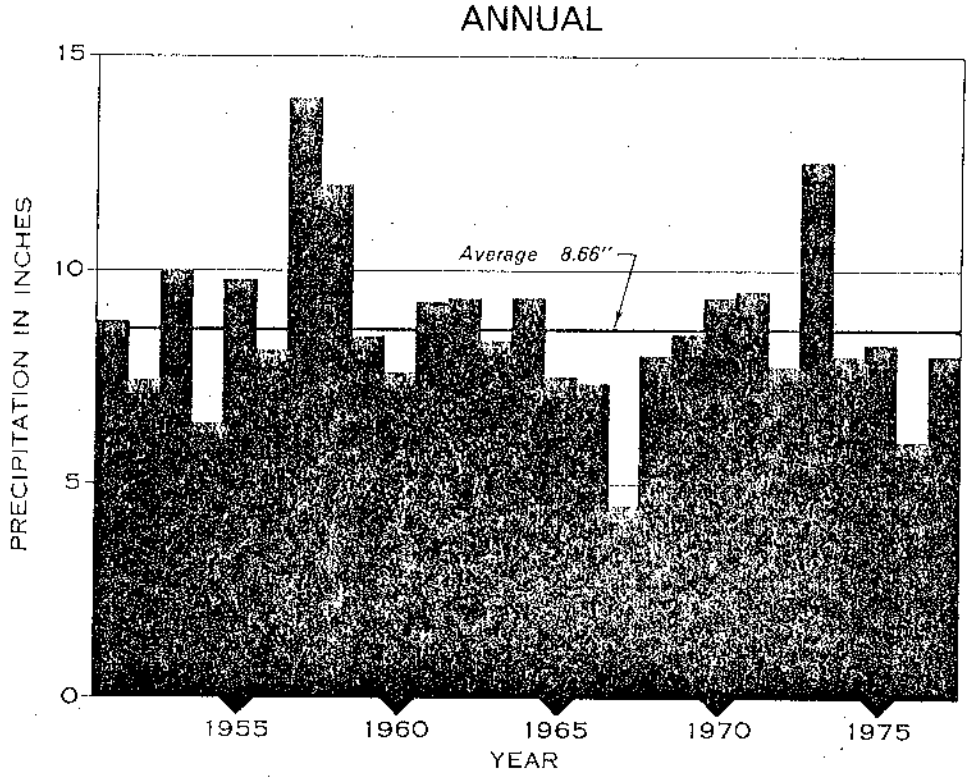
## CLIMATE MANAGEMENT NOTES

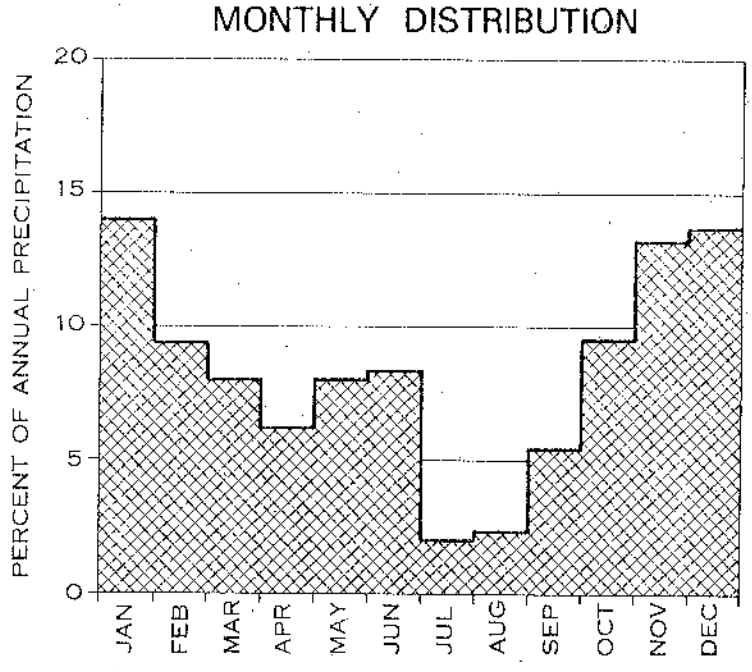
The summer climate at Hat Rock, with its hot, dry, windy conditions, is frequently not within the normal range of human comfort. There is a little shelter or shade which occurs naturally to provide relief from these conditions.

Fortunately, means of obtaining relief from these extreme conditions are readily available if water and shade are provided. When the land is irrigated and trees for shade and shelter are provided, the area becomes quite usable and popular for summer recreation.

Since irrigation is important for the recreation of the park, it will be necessary to give consideration to the availability of irrigation in order to provide for the comfort of the park users at future developments. If water for irrigation becomes scarce in the future, it will be necessary to consider methods of water storage and conservation in order to provide water during the summer months.

# PRECIPITATION
## Hermiston 2 S




Data Source: NOAA

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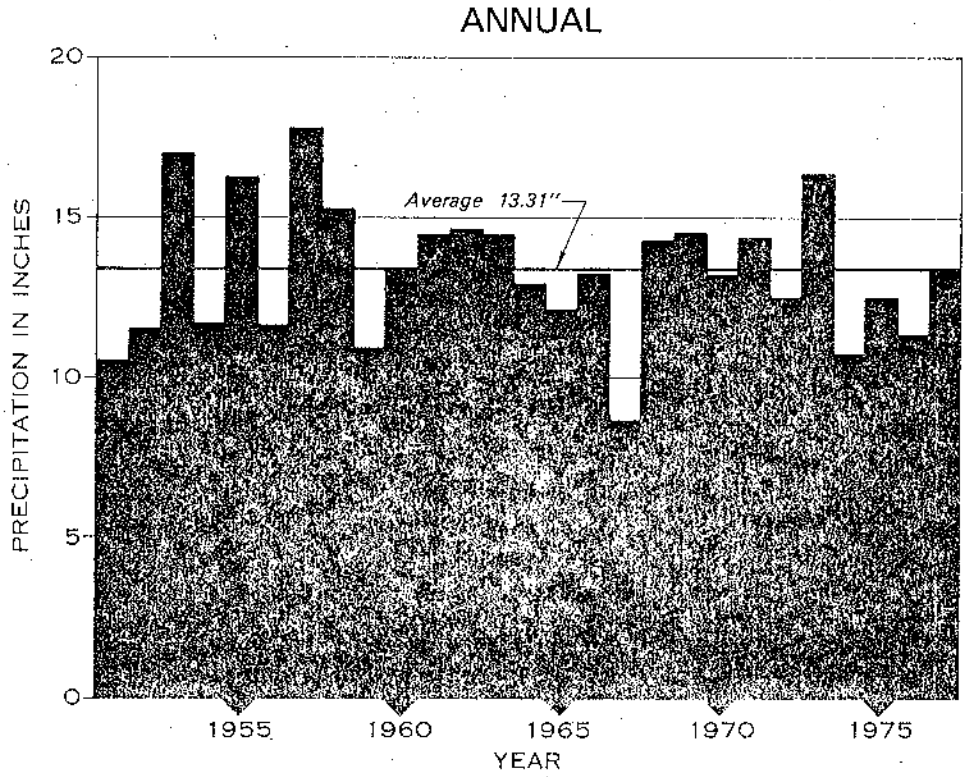
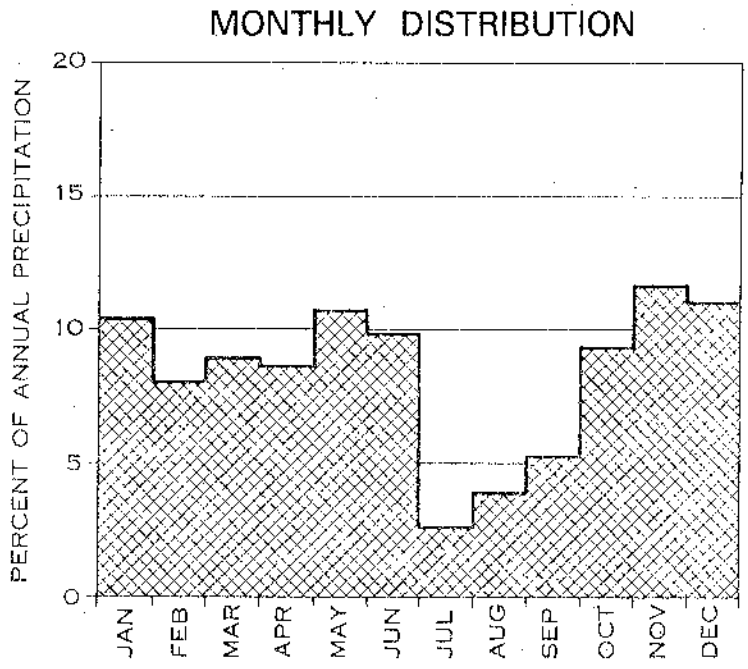
FIGURE 7

# PRECIPITATION
## Heppner



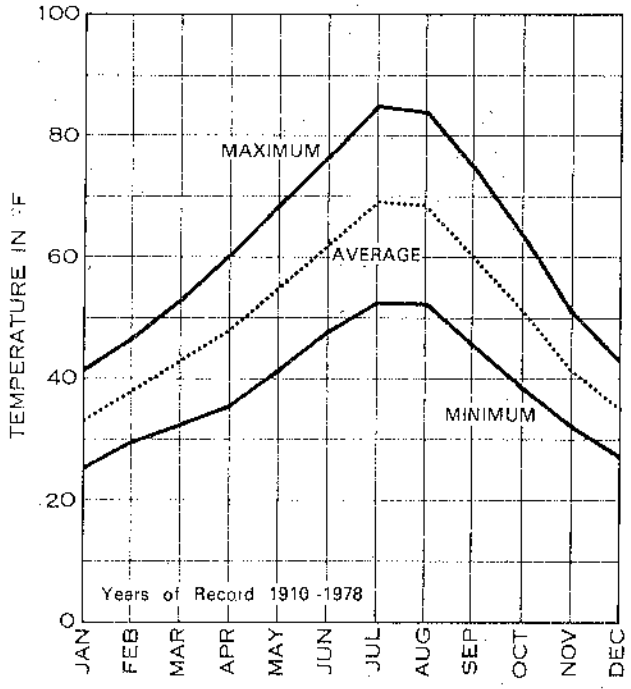

Data Source: NOAA



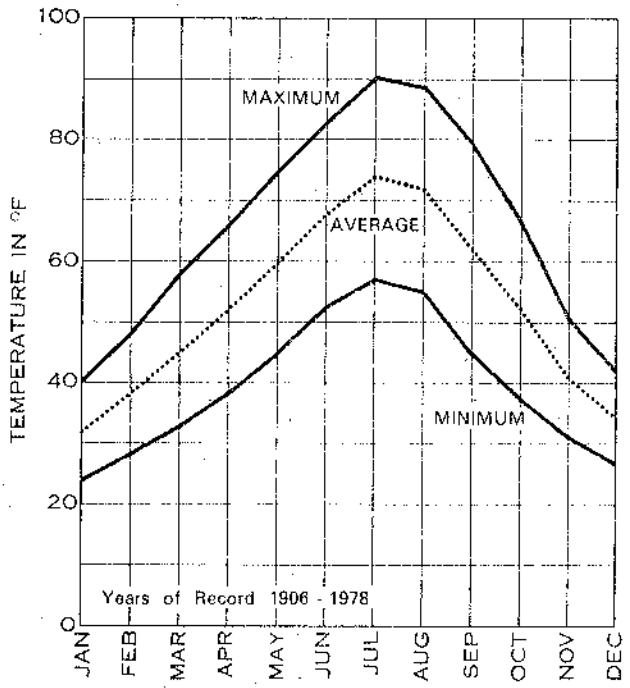
FIGURE 8

# TEMPERATURE
## MEAN DAILY

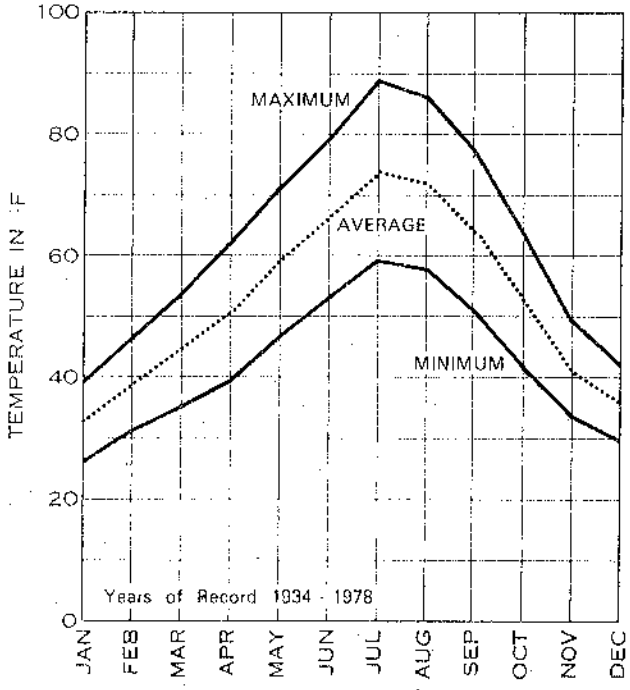
### Heppner
ELEVATION 1950'



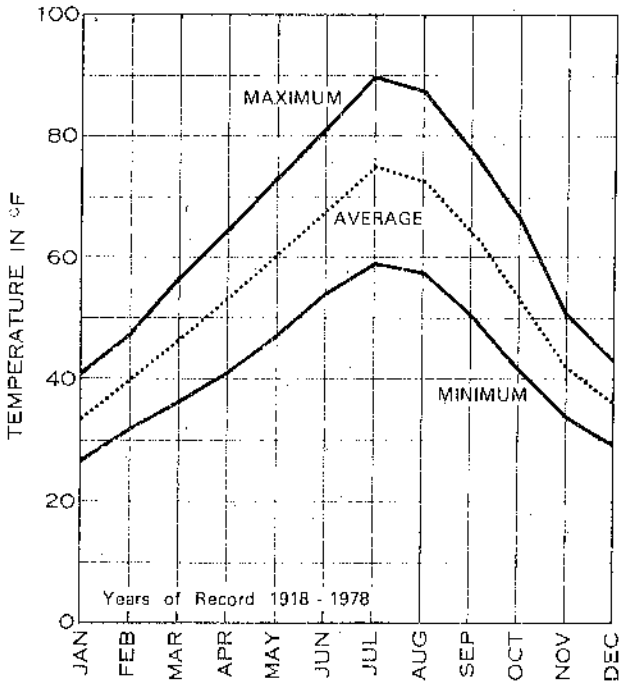

### Hermiston 2 S
ELEVATION 624'




### Pendleton WSO AP
ELEVATION 1492'




### Milton - Freewater
ELEVATION 970'




Data Source: National Weather Service, 1951-1978

FIGURE 11

# Scenic Qualities

# Scenic Qualities

The scenic qualities at Hat Rock are typical of those areas in northeast Oregon near Lake Wallula.

## LANDFORMS

The landscape in and around the park consists primarily of gentle, rolling hills broken by an occasional plateau or basalt outcropping. Two prominent basalt outcroppings in the park, Hat Rock and Boat Rock, are visible from almost all vantage points within the park. Other basalt outcroppings occur along the shore of Lake Wallula. These basalt outcroppings provide wildlife habitat as well as visual interest in the landscape.

## WETLANDS

A surprising number of ponds and marshy wetlands exist in this general area. Many of these are the result of excess runoff from the agricultural irrigation which occurs here. In the park, the runoff from the Cold Springs Reservoir to the south flows through the park in the Cold Springs Wash. A small dam creates a marshy area within the park which provides good waterfowl habitat during the winter months.

## HAT CREEK IMPOUNDMENT

Another water feature in the park is a large pond created by the damming of a natural spring at the center of the park. This pond is used for some swimming and fishing is also a popular activity. The area around the pond is irrigated and is heavily used for picnicking.

## LAKE WALLULA

The Columbia River, or Lake Wallula, as it is called in this area, is not visible from many points in the park, but it offers important scenic qualities when it can be seen.

The steep banks of the shoreline, the water and the river traffic provide many elements of scenic interest. The islands in Lake Wallula also provide scenic variety and valuable wildlife habitat as well.

VEGETATION

Except for a few weeks in the spring when the wildflowers are in bloom, the colors of the land are muted, subdued, desert colors. Grays, browns and soft greens predominate, broken by the black of basalt outcroppings and the bright green of irrigated areas.

Sagebrush, rabbit brush, and perennial grasses predominate in the dry, sandy soils of the region. The few trees which occur here are to be found near the river's edge or along the occasional ponds in the area.

SOURCES

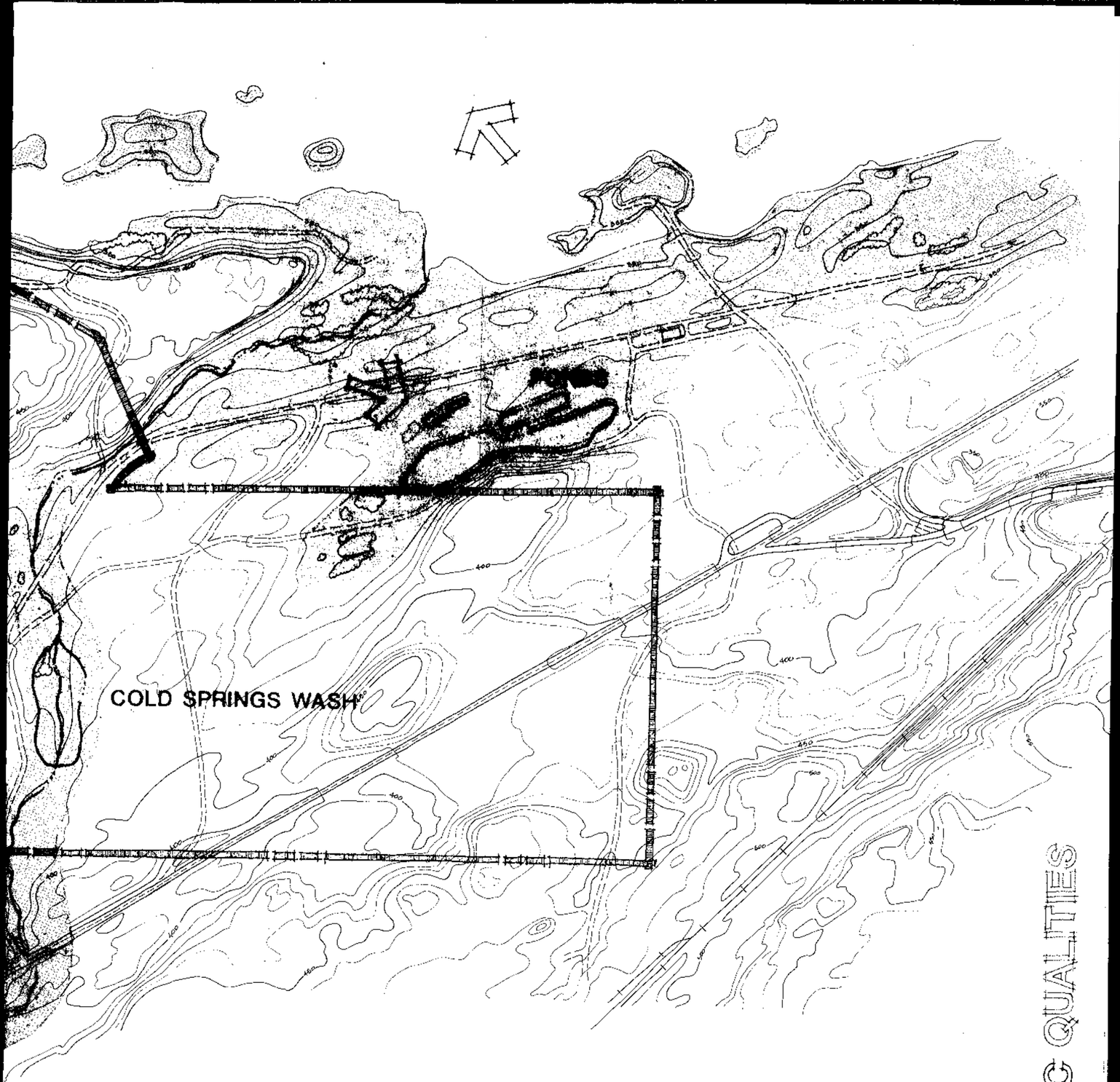
Staff field observations.

## SCENIC QUALITIES MANAGEMENT NOTES

Due to the open aspect and sparse vegetation of the Hat Rock landscape, the area is particularly sensitive to any changes or additions, especially in terms of developments. Since it is difficult to screen out unwanted elements without creating another eyesore in the process, care must be taken to see that all site developments are properly designed and located.

A case in point is the trailer park located south of the existing entrance to the park. This is an unattractive intrusion into the park scene and future designs for this area should be carefully studied to diminish its impact.

In order to prevent this kind of situation from occuring in the future it would be desirable to control all of the land surrounding the park entrance. The park should buy this land outright or obtain easements which would allow the park to control any development occuring between Route 730 and the park entrance.




400' 800' 1600'
125m 250m 500m

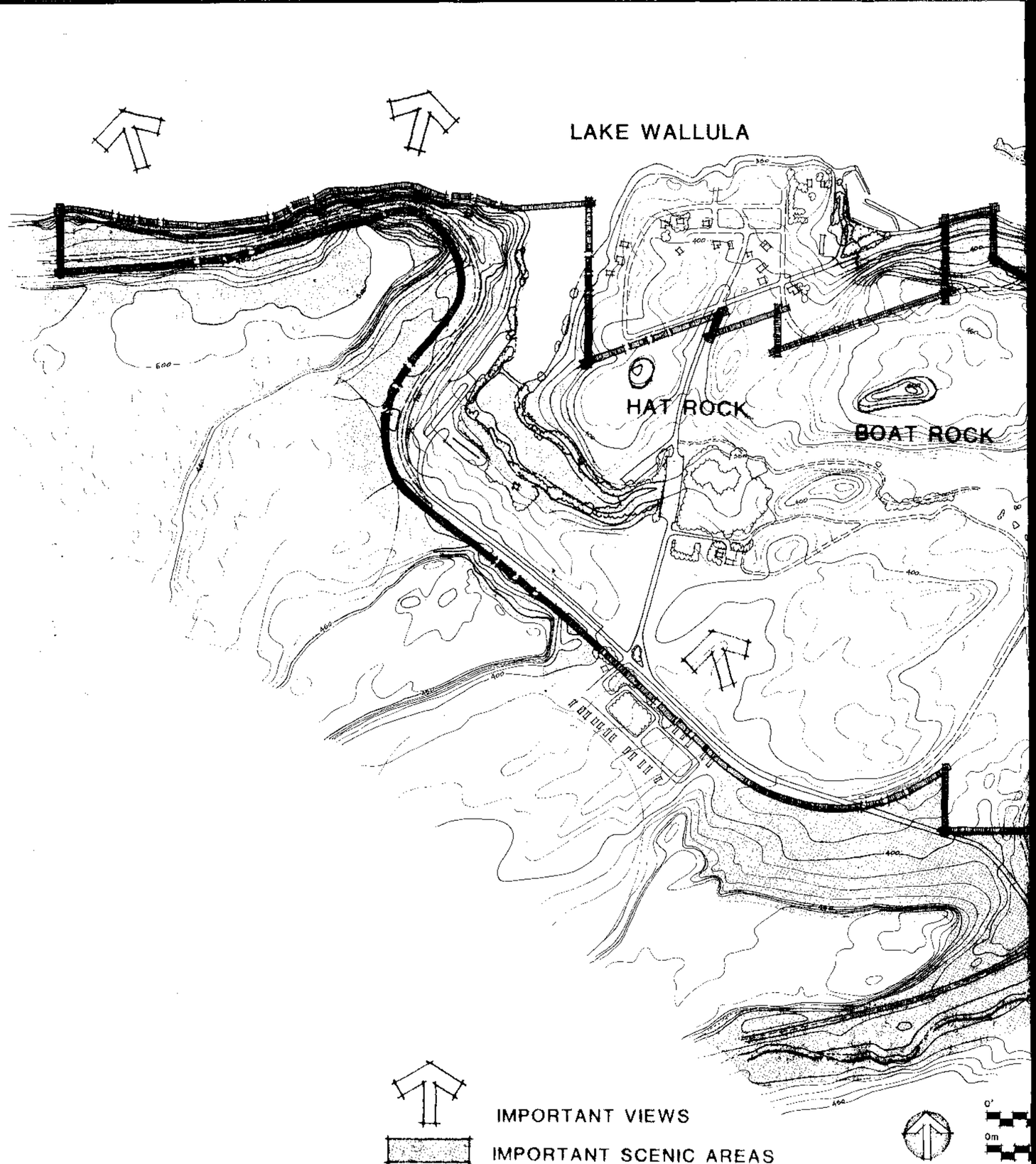
# HAT ROCK STATE PARK

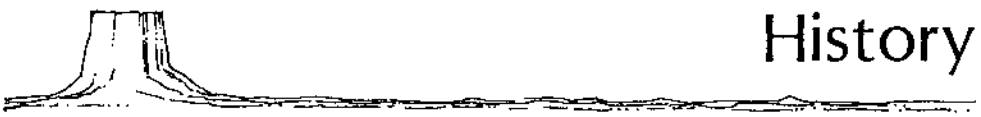
UMATILLA COUNTY, OREGON

Date: Revised:

5.12

SCENIC QUALITIES


LAKE WALLULA
HAT ROCK
BOAT ROCK
IMPORTANT VIEWS
IMPORTANT SCENIC AREAS
0'
0m



# History

# History

## THE LEWIS AND CLARK EXPEDITION

Many items of historic interest are to be found in Hat Rock State Park. Foremost among these is Hat Rock itself. This rock was the first landmark in Oregon to be identified and recorded in the maps and journals of Lewis & Clark as they made their way west along the Columbia River in 1805.

The rock is described in the first draft of William Clark's journal entry for October 19, 1805. They had travelled "S.W. 14 miles to a rock in a lar.$^{d}$ resembling a hat..." (Lar.$^{d}$ means larboard or the left side of the boat). The accompanying map in Clark's field book for October 19 also clearly shows a landmark identified as Hat Rock, with the accompanying notation: "From this rock a mountain covered with snow may be seen supposed to be the one Vancouver Lieut. calls Mount Hood."

Another entry in the journal for the same date describes how Clark climbed a cliff about 200' above the water and how from there he saw Mt. Adams (which he took at the time to be Mt. Hood).

In 1974, the Oregon Lewis and Clark Trail Committee conducted some research on the activities of the Lewis and Clark expedition in the Hat Rock area. At that time, Hat Rock was climbed and it was verified that the mountains of the Cascades, including Mt. Adams and Mt. Hood, can be seen from that point.

In April of 1974, a marker commemorating the Lewis and Clark Expedition visit to Hat Rock was erected. The text of that marker is as follows.

> THE GREAT AMERICAN EXPLORING PARTY LED BY CAPTAINS MERIWETHER LEWIS AND WILLIAM CLARK PASSED THIS POINT ON THE COLUMBIA RIVER ENROUTE

TO THE PACIFIC OCEAN ON OCTOBER 19, 1805. IN HIS JOURNAL, CLARK DESCRIBED "A ROCK RESEMBLING A HAT." AND LABELED "HAT ROCK" ON THE MAP IN HIS FIELD BOOK.

CLARK CLIMBED TO THE TOP OF THE LANDMARK AND NOTED THAT "FROM THIS ROCK A MOUNTAIN COVERED WITH SNOW MAY BE SEEN". HE FIRST SUPPOSED IT TO BE THE ONE BRITISH SEA CAPTAIN GEORGE VANCOUVER HAD NAMED MT. HOOD DURING HIS VOYAGES ALONG THE NORTHWESTERLY COAST IN THE 1790's. THE MOUNTAIN HE HAD SEEN IN THE NORTHWESTERLY DIRECTION ACTUALLY WAS MT. ADAMS. THE PEAK TO THE SOUTHWEST WHICH HE HAD SPIED BUT NOT IDENTIFIED WAS MT. HOOD.

THE EXPEDITION CAMPED FOR THE NIGHT ON THE NORTH BANK ABOUT TWENTY MILES DOWNRIVER. THERE THE CAPTAINS EXCHANGED GREETINGS AND GIFTS WITH YELLEPITT, CHIEF OF THE WALLA WALLA INDIANS. HOMEWARD BOUND THE FOLLOWING SPRING, THE EXPEDITION PASSED HAT ROCK ONCE AGAIN ON APRIL 27, 1806.

SOURCES:

Thwaites, R. G., Ed., Original Journals of the Lewis and Clark Expedition, 1804-1806, Vol. 3, New York, 1959.

State Historic Preservation Office.

Oregon Lewis and Clark Heritage Foundation Committee.

## HISTORY MANAGEMENT NOTES

The area around the base of Hat Rock is protected from intrusion by the general public by a low 3 foot chain link fence. A very distinct path has developed along the fence line. This perimeter trail should be incorporated into the trail systems to be developed at the park.

Although the fence probably keeps most people from getting near the rock, a number of people have climbed the rock and painted names and dates on it. An attempt to cover these with white paint has resulted in a more obvious eyesore than existed previously. Preferably, the rock should be cleaned of this paint. If this is not feasible, the white paint should be covered with a darker brown color.

## EARLY DEVELOPMENT

Early settlements in northeastern Oregon were connected by overland trails, some of which passed through Hat Rock State Park. An early survey done by the Surveyor General's office of Oregon in 1861 shows two trails going through the park connecting Umatilla and The Dalles to Walla Walla and the fort that was located there. There is little evidence to indicate that any portions of these trails remain.

One form of an old travel route still very much in evidence at the park is the gravel bed of the Oregon Railway and Navigation Company. Part of the gravel bed serves as the base for the park's entrance road, while other portions are utilized as service roads to undeveloped parts of the park and to Corps of Engineers land.

The Oregon Railway and Navigation Company line was constructed by Henry Villard, one of Oregon's foremost builders of railroads, as part of a larger network of railroads. The railroad line, running from The Dalles to Walla Walla, and connecting with Portland, was completed on July 1, 1882. In 1883, the OR&NC line met the Northern Pacific line, completing the second transcontinental railroad and connecting Oregon by rail with the rest of the nation.

The completion, in 1883, of another railroad line to Pendleton, provided a further impetus to settlement and opened up new markets for expansion. With reliable transport to market, wheat production rapidly became the major agricultural enterprise.

Irrigation water, which was only available near local streams in the 1880's, was greatly increased by the completion of the Cold Springs Reservoir in 1908. This provided further stimulation for the agricultural development of the area.

The wheat which was grown in the area was stored at the warehouse at Cold Springs Junction and shipped out from the Cold Springs Landing. The concrete floor of the warehouse remains alongside the railroad bed near the Cold Springs recreation area east of the park. When the McNary Dam was completed and Lake Wallula formed, the old railroad route was submerged. A new railroad line was constructed by the federal government along a route away from the river. The Oregon Railway and Navigation Company is now a subsidiary of the Union Pacific Railroad.

SOURCES:


Map of Township No. 5 North, Range 29 East, Willamette Meridian, Oregon; and accompanying field notes. Surveyor General's Office, Eugene City, Dec. 7, 1861.

Historical Early Oregon -- Western Guide Press

Atlas of Oregon, U of O Press, 1976, p. 84.

Villard, Henry, An Early History of Transportation in Oregon, U of O Press, 1944.

Umatilla County Planning Department

USDA Report on Water & Related Land Resources: Umatilla Drainage Basin. Prepared by Soil Conservation Service. December 1962.

## EARLY DEVELOPMENT MANAGEMENT NOTES

Most of the evidence of early settlement and development has been lost over the years. The trails have been obliterated and buildings are gone. However, the one element remaining which can be utilized is the gravel bed of the old railroad.

An excellent bike and/or foot trail can be developed on the existing gravel bed. Coordination of development with the Corps of Engineers could result in a trail from the Corps of Engineers recreation area at McNary Dam through Hat Rock State Park and over to the Cold Springs recreation site. This trail would parallel the Columbia River and go through some of the small wetlands back from the river as well as through the more desert-like areas of the park.

Many opportunities for interpretation of the area could be utilized along such a trail at rest stops and places of interest. Various items of historic information as well as natural history could be presented. This could include descriptions of how the Native American Indians utilized the plants of the region as well as other aspects of their culture. The trail should be paved at a width of 8 to 10 feet. The length of the trail would be three miles from the far west park boundary to the Cold Springs area.

## ARCHAEOLOGY

The presence of Native American Indians along the Columbia River and specifically in the Hat Rock area has been documented in the Oregon Archaeological Survey conducted by the University of Oregon.

Many sites were explored along the Columbia River which revealed dwelling sites, tools, bone, shells and other refuse. Unfortunately, these sites along the Columbia were inundated when Lake Wallula was formed by the damming of the Columbia in 1953. It is unlikely that further excavation will take place in these submerged sites, but their location should be noted in the event that any dredging is proposed or that any marina or docking facilities are planned. The submerged sites near the park include 4 areas near the marshy wetlands of the Cold Springs Wash and one site at the mouth of Hat Creek.

There is one documented archaeological site which remains above the waters of Lake Wallula. This site is located between the railroad grade and the river, about 0.4 mile east of Hat Creek. The site consists of a small cave at the base of a basalt escarpment overlooking the Columbia River. When the cave was explored and recorded in 1947, the evidence of habitation consisted of animal bones, charcoal and shells. The ceiling had been blackened from former fires.

## SOURCES:

State Historic Preservation Office.

Oregon Archaeological Survey, University of Oregon, Museum of Natural History.

ARCHAEOLOGY MANAGEMENT NOTES

Since most of the archaeological deposits are underwater, there is little chance that they will be disturbed. However, if any development is planned at the mouth of Hat Creek or at the mouth of the Cold Springs Wash, the State Historic Preservation Office should be contacted.

The exact location of the small cave described earlier has not been mapped. It would be valuable to know its position so that any future development could be planned around it. Recommendations from the Oregon Archaeological Survey in 1947 were for further work to consist of minor testing. Perhaps at some time in the future this will be accomplished. This cave also presents the opportunity for interpretation of Indian culture.

*Hat Rock State Park*

Hat Rock State Park is located off U. S. Highway 730, on the south shore of the lake formed by McNary Dam on the Columbia River near Cold Springs in Umatilla County.

The first acquisition was 175 acres purchased from Charles and Eileen Kik in 1951 at a cost of $5,000. Later, in 1953, another tract of 191 acres was obtained from the Corps of Engineers under a lease agreement. Two other parcels of 0.16 of an acre and 3.07 acres were acquired for the park and the road, making a total of 369.23 acres in the park.

Acquisition and development of this area for recreational purposes was desirable because it is the area most suitable for development along the shore of McNary Lake.

The land obtained from the Corps of Engineers includes an arm of the lake about 1,600 feet in length and a large, prominent rock, a landmark of historical significance. This landmark, known at Hat Rock, was often referred to in diaries of the early-day western explorers and travelers. The rock itself is round with a flat top and vertical sides.

Hat Rock State Park was named after this large monolith, which, no doubt, acquired its name because of its likeness to a man's silk top hat.

The terrain is generally rolling, cut by an arm of the lake. The cover is sagebrush and of little or no value to the park. A road passes through the park to a home development on the shore of the lake north of the park.

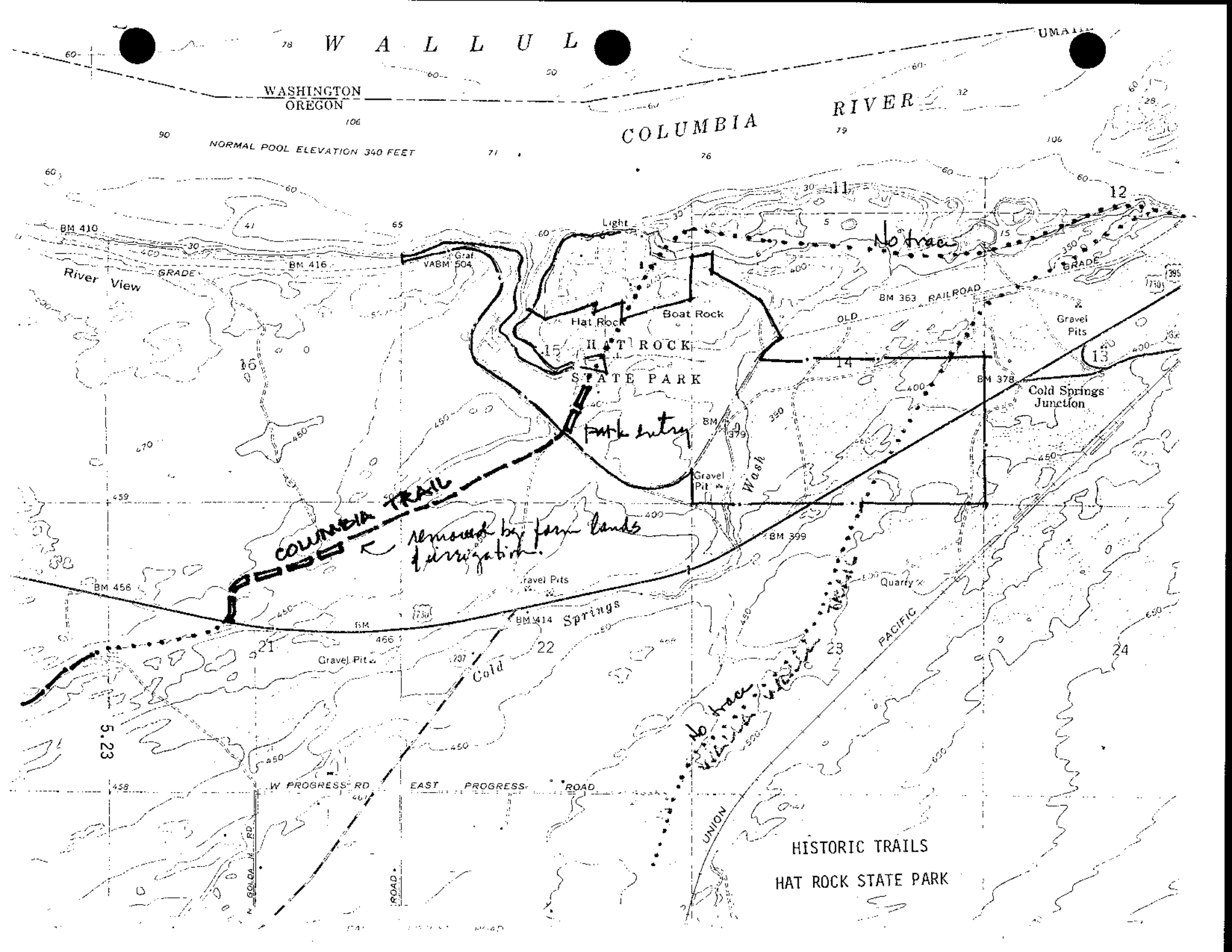
A large, natural spring is located on the park land at normal water level near the southern tip of the arm of the lake. It flows at approximately 25 c.f.s., which furnishes plenty of water to supply the park and meet the present needs of the home development on the lake shore.

Improvements at Hat Rock include an entrance road, car parking area, trails, planting trees, swimming beach, bathhouse, guard fences, two sanitary facilities, water system, park cottage and headquarters building. All roads and car parking areas are oil surfaced. The Corps of Engineers constructed a road to the west side of the arm of the lake, a car parking area, boat ramp and a floating foot bridge, and prepared and seeded a nearby area to lawn, all as a part of the park facilities.

Park use in 1963 totaled 191,011 day visitors.

Permits as follows affect this park:

| *Number* | *Date* | *Name* | *Expiration* |
|---|---|---|---|
| 3809 | 12– 3–51 | Umatilla Electric Co-op.—power line | Indefinite |
| 3792 | 4–12–56 | Hat Rock Water Co.—pipe line | 4–12–79 |
| 4155 | 3–24–53 | Pacific Tel. & Tel.—phone line | 3–24–78 |
| 22776 | 1954 | Water right—0.225 + 7.00 c.f.s.—spring | |
| G 1824 | 4–10–51 | Water right—0.26 c.f.s.—spring | |


WALLUL
WASHINGTON
OREGON
COLUMBIA RIVER
NORMAL POOL ELEVATION 340 FEET
River View
GRADE
BM 410
BM 416
Graf
VABM 504
Light
Hat Rock
Boat Rock
HAT ROCK
STATE PARK
park entry
BM 363
RAILROAD
OLD
GRADE
Gravel Pits
BM 378
Cold Springs Junction
Gravel Pit
Wash
BM 379
COLUMBIA TRAIL
removed by farm lands
for irrigation.
BM 399
BM 456
Gravel Pits
Quarry
BM 414
Springs
Cold
Gravel Pit
PACIFIC
UNION
no trace
no trace
W PROGRESS RD
EAST PROGRESS ROAD
GOLDA RD
ROAD
HISTORIC TRAILS
HAT ROCK STATE PARK
5.23

ADAMS ATHENA ECHO HELIX PILOT ROCK STANFIELD UKIAH WESTON

Umatilla County, Oregon

Steve Randolph, *Planning Consultant for the Small Cities*
County Courthouse Office
P.O. Box 1427
Pendleton, Oregon 97801
503-276-7111,ext.253

Ranch Office
Star Route, Box 850
Pendleton, Oregon 97801
503-276-9070

May 11, 1981

Nancy H. Gronowski
Landscape Architect
Department of Transportation
Parks and Recreation Division
525 Trade Street SE
Salem, Oregon 97310

Dear Nancy,

Thank you for your patience! It has been very hectic around here since early April, and I'm afraid that your problem with the railroad at Hat Rock just slipped my mind.

I am forwarding copies of your letter to Susan Temple, Dorothy Kopacz, and Bob Mumm, all of whom are members of the Board of Directors of the Umatilla County Historical Society. They are more familiar with this site than am I, and I hope they will respond to your inquiries.

From my knowledge of the Cold Springs Junction, the slab you found was probably the floor of the old grain warehouse. Cold Springs Junction and nearby Cold Springs Landing served as shipping points for the wheat crop for the north, middle and south Cold Springs Canyons and other farming areas north of Pendleton. I know that sacked wheat from the Mumm Ranch eight miles north of town was hauled by wagon the 25 miles to Cold Springs Junction along a route that is now State Highway 37. I would presume that cattle, sheep, and wool were also shipped out via the station. A town, Cold Springs, was platted south of the station, but is presently undeveloped. I believe the old railroad route was dismantled about 1957 upon completion of the McNary Dam on the Columbia River. Lake Wallula flooded much of the old route, so the U.S. Government paid for a new rail line for the Union Pacific, of which the Oregon-Washington Railway and Navigation Company is a wholly-owned subsidiary.

I hope this information will be useful in your work. Air photo maps, plat maps, and an 1893 map of the county are being sent under separate cover.

Cordially,

5.24

Steve Randolph
Umatilla County Planning Coordinator
cc: Susan Temple, Dorothy Kopacz, Robert Mumm

# Oregon Archaeological Survey

**University of Oregon, Department of Anthropology**

1. County UMATILLA 2. Site No. 35-UM-6 3. Type of site Rock Shelter
4. Map Location T. R. S. ; ¼ of 5. Cultural Affiliation

5. Location At base of lava escarpment ½ mile east of the butte known locally as "Medicine Hat"
SW¼ of NW¼ Sec. 14 T. 5N R. 29E
6. Owner and address -
7. Present occupant none
8. Attitude toward excavation
9. Site description. (midden, house pits, etc.) low, overhanding, basalt rock shelter 15' long x 9' deep x 3' high - dry rock wall at west end separates high portion of shelter from lower section.
10. Area of occupation 15' long x 9' from front to back - shelter is 3' high
11. Depth and character of fill 6" of black midden material contains animal bones, charcoal, and shells
12. Vegetation cover
13. Present condition undisturbed
14. Material previously collected none
15. Present location of (14) and owner -
16. Material (14) examined.
17. Material collected by survey none
18. Recommendation for future work no
19. Possible camp location if 18 is yes.
20. Sketch map of site by
21. Photograph Nos. none
22. Recorded by Fenenga Date 17 July 1947

County

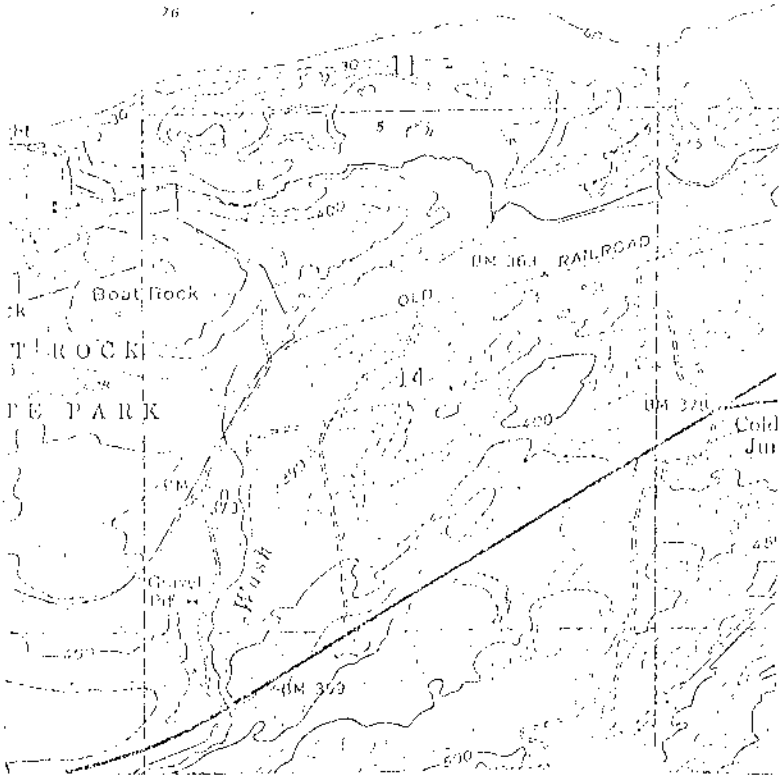
Site No.

23. Approach to site:

24. Location of camp facilities:

Site is at base of lava escarpment, talus slopes down to a broad flat to Columbia River to the NW ceiling is smoke blackened.

25. Remarks:



OREGON ARCHAEOLOGICAL SURVEY
OREGON STATE MUSEUM OF ANTHROPOLOGY
University of Oregon, Museum of Natural History

County Umatilla Site No. 35 UM 6 Site Name

Cultural Affiliation

Location NW-1/4 Sec. 14 , T. 5 N , R. 29 E

Site 35 UM 6 is located ca. .4 mi. upriver from Hat Creek at the high water mark of the McNary pool.

Site Description ( *midden, house pits, etc.*) small cave

Area of occupation

Depth and character of fill

Date of excavation

Extent of excavation

Present condition of site ( *date* )

Material collected and present location ( *acc. no., cat. nos.* )

Photograph catalog nos.

Bibliographic references Appraisal of the Archeological Resources of the McNary Reservoir, Oregon and Washington. January 1948. Smithsonian Inst. River Basin Surveys, Columbia Basin Project.

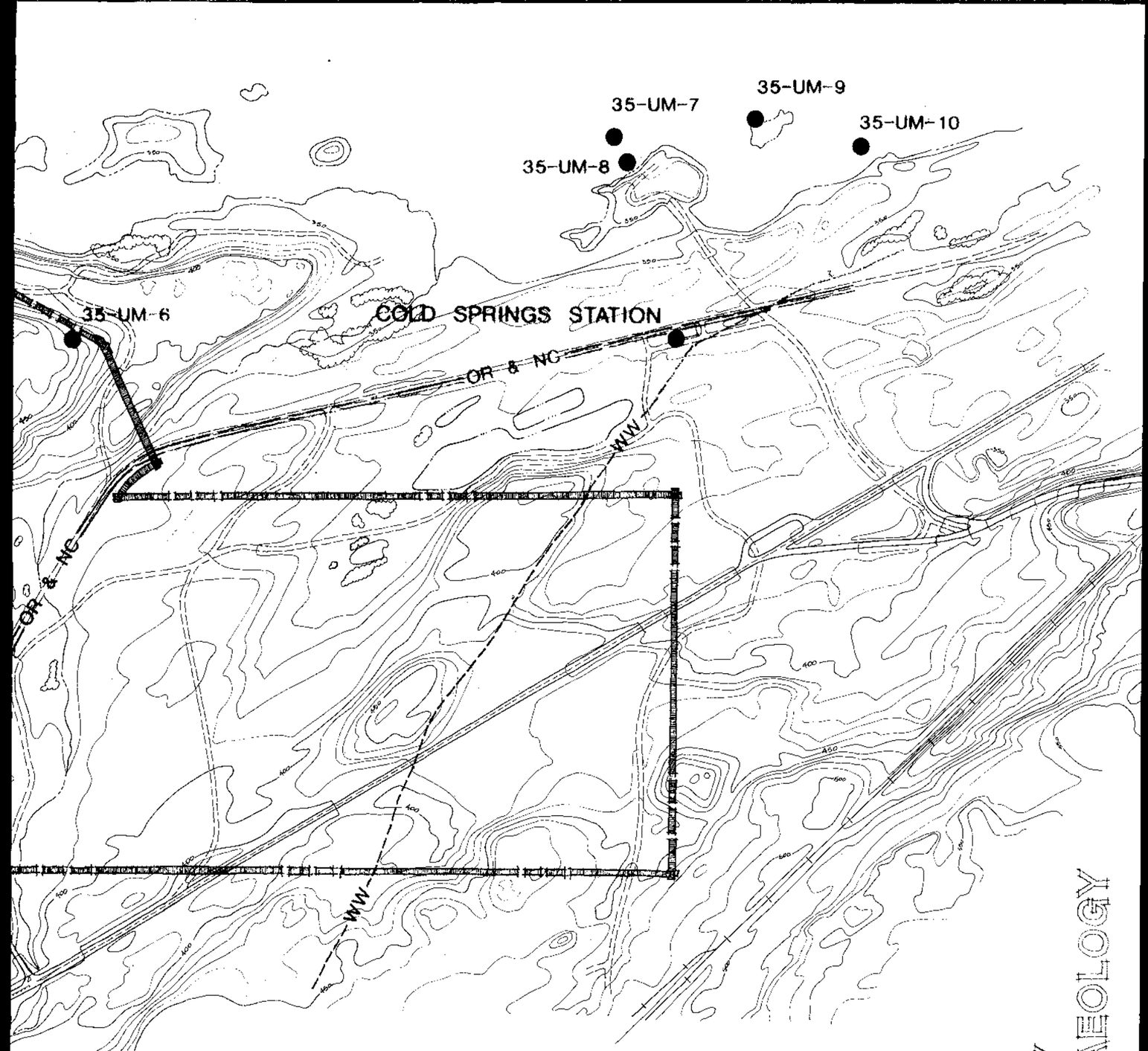
5.27

Recommendations for further work testing - minor

( *remarks on back* )

Recorded by: F. Fenenga Date: Summer 1

Site No.




400' 800' 1600'
125m 250m 500m

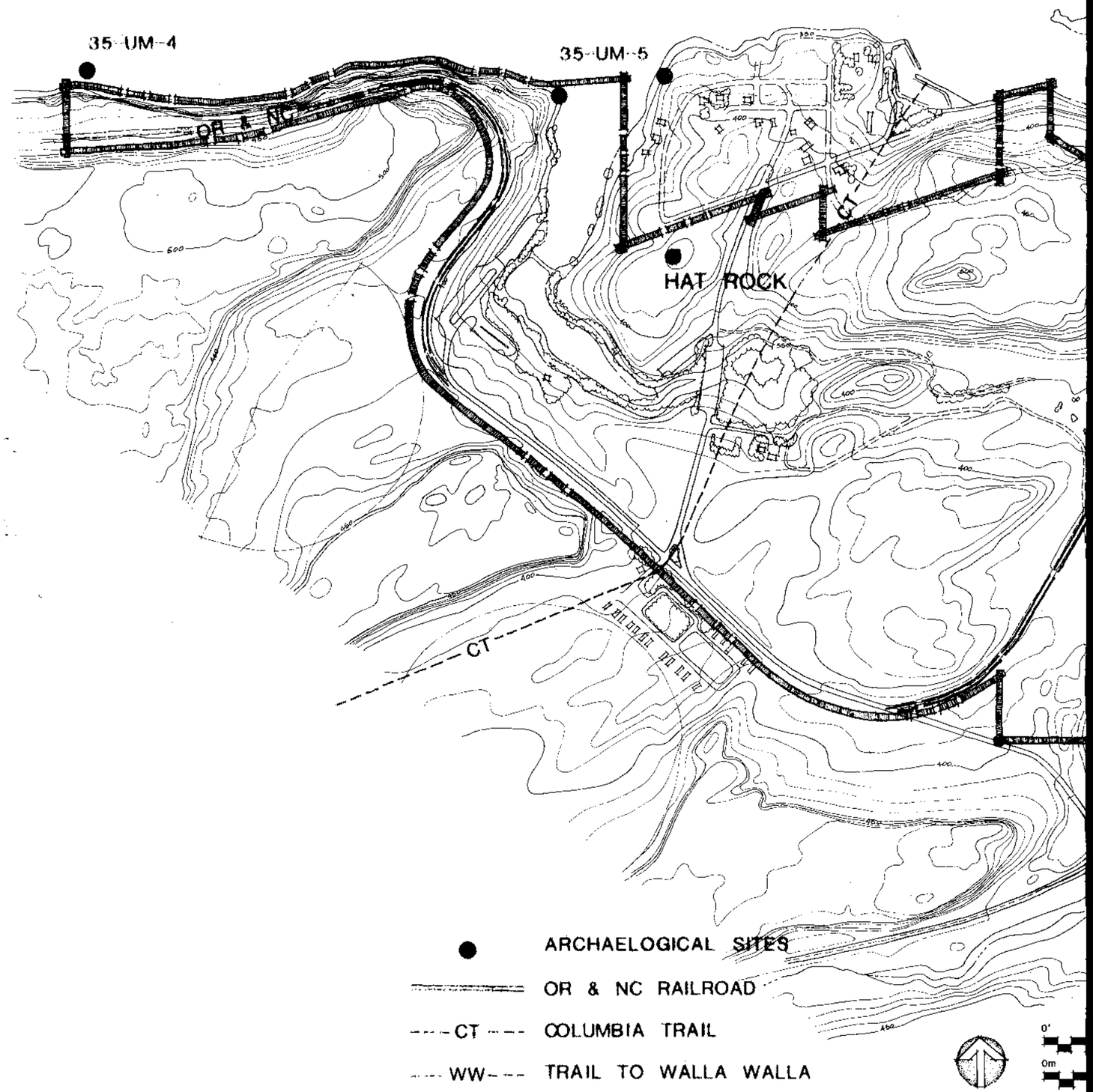
# HAT ROCK STATE PARK

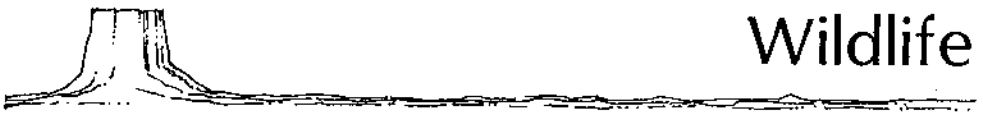
UMATILLA COUNTY, OREGON

Date: Revised:

5.28

HISTORY & ARCHAEOLOGY


35-UM-4
35-UM-5
OR & NC
HAT ROCK
CT
ARCHAELOGICAL SITES
OR & NC RAILROAD
CT COLUMBIA TRAIL
WW TRAIL TO WALLA WALLA
0'
0m



# Wildlife

# Wildlife

## HABITATS

The diversity of habitats at Hat Rock results in an interesting variety of wildlife to be observed there. Cliffs, slopes, wetland habitat, plants for food and cover, and adequate water supplies ensure that many species of wildlife will thrive as long as quality environments are protected.

## RIPARIAN HABITATS

Riparian habitats, which are identified by the presence of vegetation which requires free or unbound water or conditions that are wetter than normal, include the shore area of Lake Wallula, the shore of the impoundment of Hat Rock and the marshy area around Cold Springs Wash.

These areas, although small in total area, have more plant and animal life within their boundaries than is typically found in the surrounding areas. The riparian habitats also support a greater diversity of animal species than is found in the surrounding areas.

Riparian habitats are made up of a number of elements which are sensitive to alteration, including the relatively small surface area, the distinct micro-climate, and the quality and quantity of water. As a result of these constraining features, riparian habitats must be considered as fragile.

The riparian habitat, in addition to its importance for wildlife, is also apt to be most desirable for other activities such as camping and recreation activities. Conflicts will arise which may need expert advice from fish and wildlife management specialists in those areas where wildlife values are to be protected.

The riparian habitats at Hat Rock provide food, cover and nesting sites for many waterfowl including Canada geese and many species of ducks. Beaver and muskrats also thrive in these habitats. Predators and larger mammals such as mule deer use the areas as well.

## BASALT CLIFFS

The basalt cliffs found along the shore of Lake Wallula and in other areas throughout the park are an important wildlife habitat because of the structural nature of the cliffs. The columnar formations provide cracks and ledges which offer shelter for many creatures including bats, marmots, squirrels and mice.

The cliffs are also very important in providing nesting sites to larger numbers of birds. Among these are barn owls, various swifts and swallows.

The cliffs along Lake Wallula immediately west of the arm of the lake are especially noteworthy since they have the highest concentration of barn owls nesting in one area in the state. The owls use the caves which are in the cliffs.

## TALUS SLOPES

The talus or fallen rock which accumulates at the base of steep slopes also offers another kind of habitat. Mice, marmots and lizards are among the creatures which utilize the spaces between the rocks for cover and shelter. The larger the openings in the rocks, the larger the species of animals which will use the area. These small animals also attract a number of predators including hawks, owls, coyotes, and rarely a bobcat.

## SANDY SOILS

Areas of sandy soils make up a large part of the habitat of Hat Rock. These areas support populations of coyote, badger, mice, jack rabbits, cottontails, and deer. These areas are also important nesting sites for the long-billed curlew. The birds nest in the short grass areas and are typically found here from April through August before migrating south for the winter.

Although not listed on the federal lists of rare and endangered animals, the leopard lizard (Crotaphytus wislizeni) is reaching the northward limits of its habitat in Oregon. A small population of these lizards have been documented at Hat Rock. They live in the loose, sandy soils in the shrubby areas of the park. Unless there is a large scale destruction or change in their habitat, they should be able to survive in the undisturbed areas of Hat Rock.

ENDANGERED SPECIES

As part of the planning process for the development of a master plan, the staff contacted the Department of the Interior, Fish and Wildlife Service, Endangered Species Team, for information on endangered and threatened species of plants and animals.

There are no known endangered or threatened species at Hat Rock.

The only species listed that may occur in Hat Rock State Park is the Bald Eagle (Haliaeetus lencocephalus). Investigation of the bald eagle population in this area indicates that though no eagles have been known to nest or roost at Hat Rock, the possibility that they might does exist. Many areas near Hat Rock receive fairly heavy use by the eagles during the winter months. Several eagles have been observed wintering at Cold Springs National Wildlife Refuge and 40 to 50 winter at Umatilla National Wildlife Refuge. There was one known case of an unsuccessful nesting at the Umatilla NWR in the winter of 1979.

It has been noted that increased eagle use of an area frequently follows increased waterfowl use. At Hat Rock, waterfowl use has been increasing. Also, the use of Hat Rock by people is low in the winter, which is the time that eagles would be most likely to use the area.

NO HUNTING

It has been noted through observation that there seems to be more wildlife present on the State Park lands than on the adjoining Corps of Engineers lands. It is thought that this probably occurs because the Park lands are fenced and because no hunting is allowing on the park land.

## FISHING

Presently, the impoundment of the arm of Lake Wallula is stocked with fish by the Oregon Fish and Wildlife Commission. The stocking consists of putting in 5000 fingerlings in April and 3500 legal rainbow trout 4 times a year. If at some time in the future the dike were removed, this area would not be stocked with trout. Fishing would then be for such species as small mouth bass.

The nearest area to Hat Rock where ponds are stocked with trout is in the area below McNary Dam. Fishing is done primarily from the banks of small ponds there.

## SOURCES:


Wildlife Habitats in Managed Rangelands - the Great Basin of Southeastern Oregon, Thomas and Maser, eds., General Technical Reports - PNW-84, 80, 85, 99, 86.

Endangered Plants and Animals of Oregon II - Amphibians and Reptiles, Special Report 206, Oregon State University, Corvallis, 1966.

Oregon Department of Fish and Wildlife, Staff Biologist in Portland and Pendleton.

U.S. Army Corps of Engineers, Walla Walla District.

Nature Conservancy, Portland, Oregon.

U.S. Fish and Wildlife Service, Olympia, Washington and Umatilla National Wildlife Refuge, Oregon.

## WILDLIFE MANAGEMENT NOTES

### HABITAT MANAGEMENT

Hat Rock has many interesting habitats to be considered and protected as part of the planning process.

Some habitats are granted a certain degree of protection by their inaccessibility such as the cliffs and the talus slopes. Other areas such as the riparian habitats which are more accessible and more limited in area may need some degree of protection while still allowing for recreation development in the area. The type and extent of development being planned needs to be studied in order to determine the proper kind and amount of habitat protection since any removal or destruction of habitat usually results in the elimination of those animals dependent on that habitat.

### ENDANGERED SPECIES MANAGEMENT

There are certain legal requirements involved in development of the park if endangered species are present. These requirements pertain to proposed construction on federal lands, i.e. the Corps of Engineers and BLM lands which are within the park boundaries. If we are proposing construction, we must request an endangered species list from the U.S. Department of the Interior, Fish and Wildlife Service, and do a biological assessment which would include an on-site inspection of the area affected by the proposed construction, data and literature review, interviews with various experts for unpublished data, review and analysis of the proposal and alternate measures.

Master planning, as a non-construction activity, does not require a biological assessment, though one has basically been effected by the investigations done on the bald eagle habitat at Hat Rock.

In any case, endangered or threatened wildlife or plant species should be noted and the proper authorities notified for their advice and expertise.

## BALD EAGLE HABITAT MANAGEMENT

Since Hat Rock has potential for bald eagle habitat, some basic criteria for management will be included here.

The primary goal of these criteria is to maintain or improve the condition under which bald eagles survive and to preserve at least the present populations of eagles in the area.

The most important thing in maintaining eagle habitat is to eliminate human disturbance, especially during nesting.

If nesting occurs, human activities within a radius of 330 feet from the nest should be completely curtailed and activity within a radius of 660 feet should be severely reduced. Limited human activities such as solitary hiking, bird watching and fishing are permissible. If nesting occurs where human activity has been occuring, that activity may continue, but not be expanded. If eagles are observed nesting at the park, the Department of the Interior, Fish and Wildlife Service should be notified for further management guidance.

In order to encourage eagle feeding, use of toxic chemicals should not be used in watersheds where eagles feed. Human activity should be reduced along the areas where eagles feed. Roost or perch trees along the shoreline and old growth trees near existing nests should be saved.

## HUNTING

As mentioned previously, the Corps of Engineers allows hunting to occur on their property. They have requested that we allow this use to continue if and when we acquire the property that they now manage. The Oregon Department of Fish and Wildlife is also interested in maintaining duck hunting in the east part of the park along the banks of Lake Wallula and around the islands.

## PRAIRIE FALCON NESTS

About six years ago there were active prairie falcon nests in the basalt cliffs at the northwest end of the park. The Oregon Department of Fish and Wildlife is interested in creating a "hacking area" here; i.e. reintroducing the species. They will be conducting a habitat survey in the spring and summer of 1983 to make final determinations about where to concentrate their efforts. If they choose to use this area of the park, they have expressed the need for as little disturbance as possible to occur.

If a reintroduction of prairie falcons is successful and if the proposed bike/hike trail becomes a reality, it will be preferable that use of the trail be restricted or curtailed during the nesting season of April 1 to June 30. Prairie falcons are very intolerant of disturbance.

The Fish and Wildlife field biologists from Pendleton will keep us informed of their efforts in this area.

VICTOR ATIYEH
GOVERNOR

# Department of Fish and Wildlife

REGION IV—NORTHEAST OREGON

~~RT. 2, BOX 2282, LA GRANDE, OREGON 97850, PHONE 963-2138~~
Rt. 1-Box 18 Pendleton, OR 97801

March 25, 1981

Dept. of Transportation
Parks and Recreation Division
525 Trade Street SE
Salem, OR 97310

ATTENTION Nancy H. Gronowski

Dear Nancy:

In response to your letter relative to wildlife concerns in or near Hat Rock State Park, I have the following comments:

On the enclosed map I have indicated the two areas of concern.

1. In section 16 along the Columbia pool there is about a mile of high cliffs. Two prairie falcon nests have been active in the cliffs for the past six years. Six or more barn owl pairs also use the caves associated with the cliffs. Any activity adjacent to these sites will terminate use by the nesting birds.

2. In section 14 there are several islands and a marsh associated with Cold Springs Wash where it flows into the Columbia River pool. This area is heavily used by waterfowl during the winter months. Some goose nesting occurs on the islands in the spring. Fur bearers, such as mink, muskrat and beaver are also associated with the marsh area.

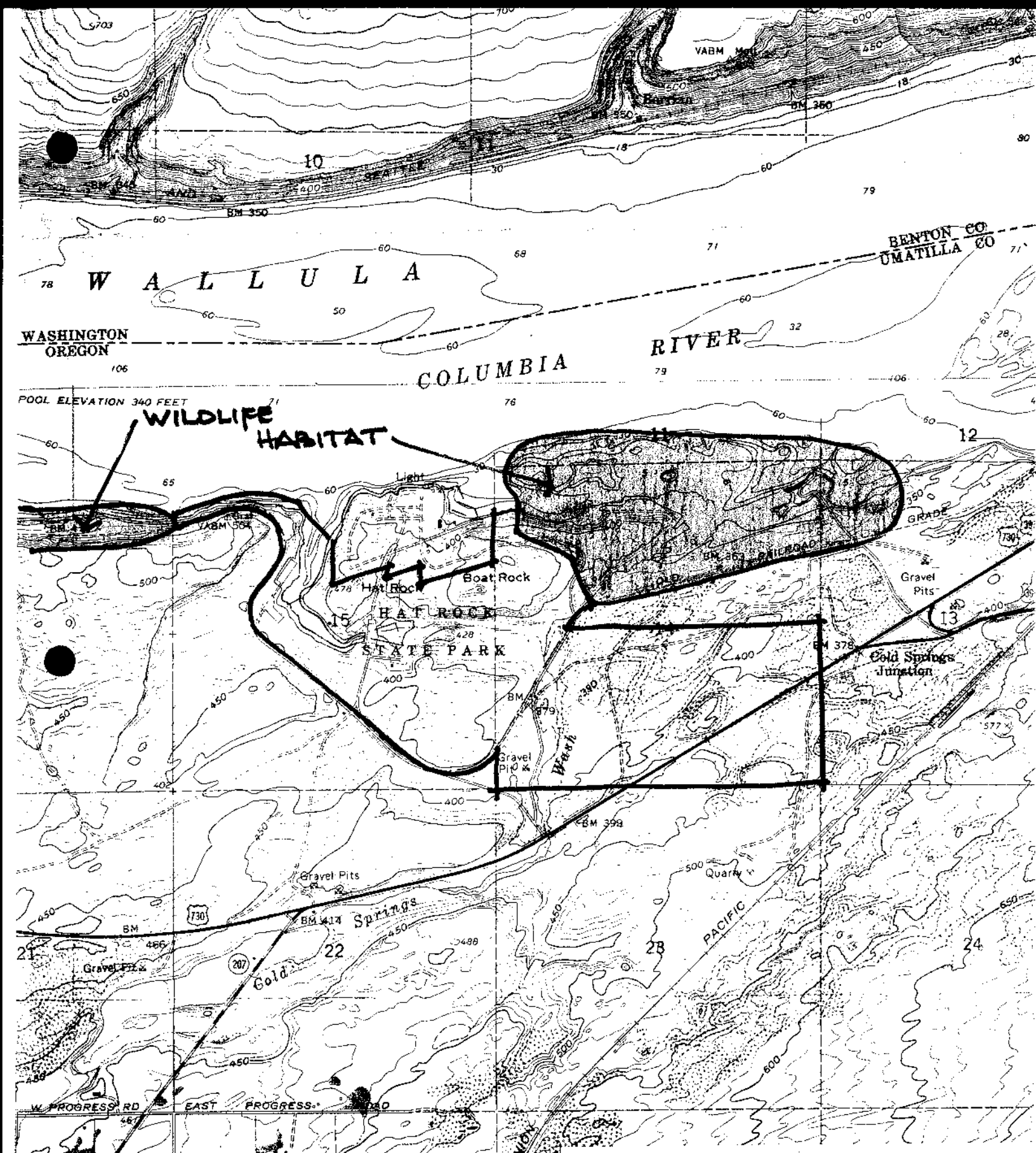
Without knowing the degree of development planned for the area I am unable to predict what their effects will be on fish and wildlife values.

Yours truly,

Donald Wilt
District Wildlife Biologist

DW: cd

5.37




HAT ROCK QUADRANGLE (USGS)
UMATILLA COUNTY, OREGON
T5N, R29E, SECTIONS 14 & 15

5.38

# Endangered Plants and Animals of Oregon

## *II. Amphibians and Reptiles*

Special Report 206
January 1966

Agricultural Experiment Station
Oregon State University
Corvallis

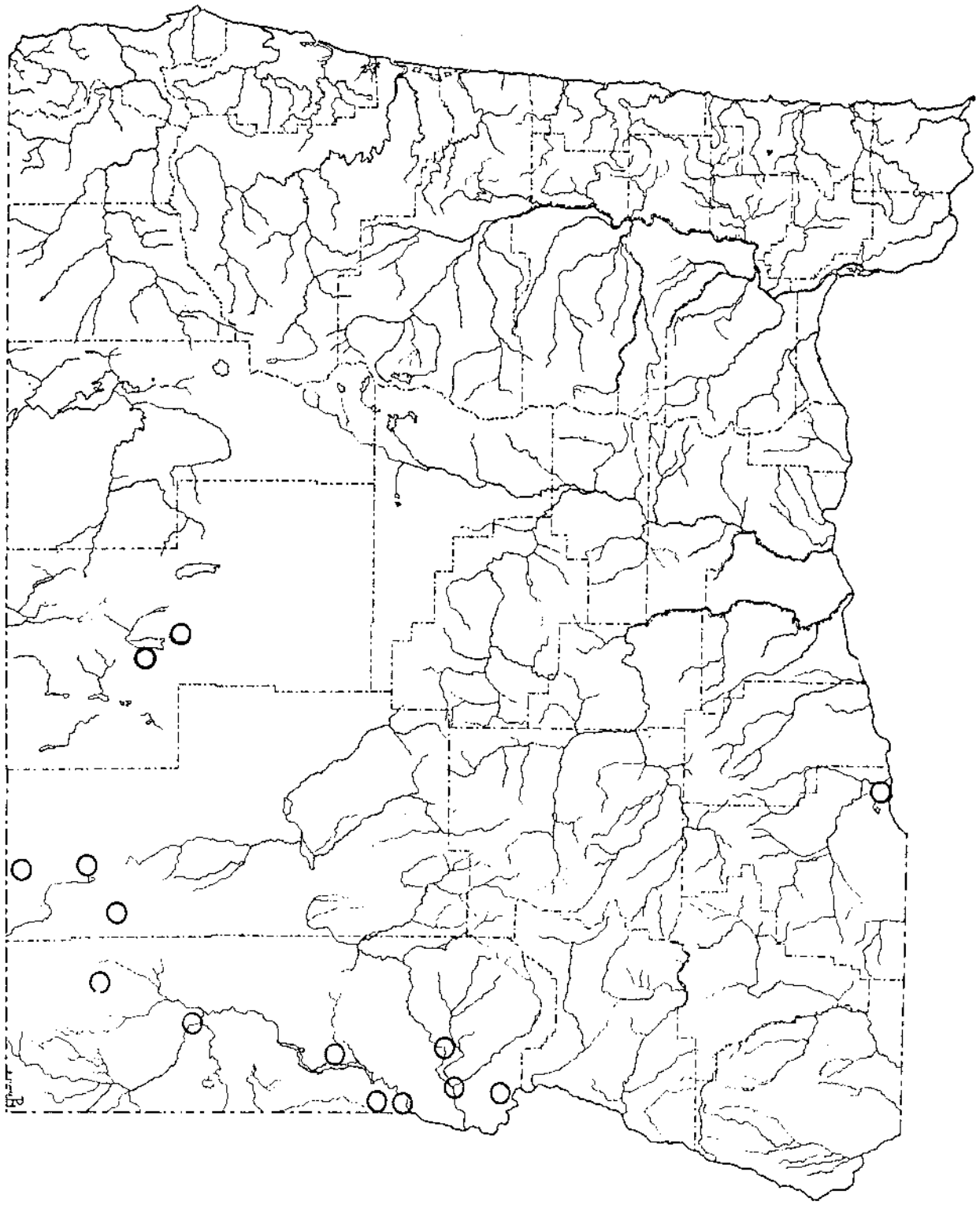


Figure 7. Distribution of the leopard lizard (Crotaphytus wislizeni).

# McNary Wildlife Park

Many birds, mammals, reptiles, fishes and insects not listed below probably visit McNary Wildlife Park. You can help improve the accuracy of this list by reporting your sightings to:

Department of Army
McNary Project Office
Walla Walla District, Corps of Engineers
P.O. Box 1441
Umatilla, Oregon 97882

## BIRDS COMMON TO THE WILDLIFE PARK

The following legend indicates relative abundance of each species for each season of the year. Local nesting species marked with an asterisk (*) nest in the park.

a – abundant, very numerous
c – common, certain to be seen in suitable habitat.
u – uncommon, present but not certain to be seen.
o – occasional, seen only few times during season.
r – rare, seen intervals 2-5 years.

| | |
|---|---|
| Spring | March - May |
| Summer | June - August |
| Fall | September - November |
| Winter | December - February |

5.41

## BIRDS

| | SPRING | SUMMER | FALL | WINTER |
|---|---|---|---|---|
| Common Loon | | | | o |
| Horned Grebe | u | u | u | |
| Eared Grebe | o | o | | |
| Western Grebe | u | o | o | u |
| *Pied-billed Grebe | c | c | c | c |
| Double-crested Cormorant | | | | o |
| *Great Blue Heron | c | c | c | c |
| *Black-crowned Night Heron | c | c | c | c |
| American Bittern | | r | | |
| *Canada Goose | u | o | u | u |
| Whistling Swan | | | | r |
| *Mallard | c | c | a | a |
| *Pintail | o | o | o | c |
| Gadwall | u | | | c |
| *Green-winged Teal | u | u | c | c |
| *Blue-winged Teal | o | c | o | |
| *Cinnamon Teal | c | c | o | |
| European Widgeon | | | | r |
| *American Widgeon | c | o | c | c |
| *Wood Duck | u | u | u | c |
| Redhead | | | o | o |
| *Shoveler | o | | o | o |
| Ring-necked Duck | | | | o |
| Canvasback | | | | o |
| Lesser Scaup | | | o | o |
| Common Goldeneye | | | o | o |
| Barrow's Goldeneye | | | o | o |
| Bufflehead | | | o | u |
| Ruddy Duck | | | | o |
| Hooded Merganser | | | | o |
| *Common Merganser | o | | o | o |
| *Sharp-shinned Hawk | u | u | u | u |
| Cooper's Hawk | | | | o |
| Rough-legged Hawk | o | | | o |
| *Red-tailed Hawk | u | u | u | u |
| Swainson's Hawk | u | o | | |
| Bald Eagle | | | | r |
| Osprey | o | o | o | |
| *Marsh Hawk | u | u | u | u |
| *American Kestrel | c | c | c | c |
| *California Quail | a | a | a | a |
| *Ring-necked Pheasant | a | a | a | a |
| Sandhill Crane | r | | | |
| Virginia Rail | | r | | |
| *Sora Rail | u | u | u | u |
| *American Coot | c | c | c | c |
| *Killdeer | c | c | c | c |
| *Common Snipe | u | u | u | u |
| Long-billed Curlew | o | o | | |
| Spotted Sandpiper | o | | | |
| Baird's Sandpiper | o | | | |
| Least Sandpiper | o | o | | |
| Western Sandpiper | u | u | | |
| Greater Yellowlegs | o | o | | |
| Long-billed Dowitcher | | o | | |
| American Avocet | u | o | | |
| Wilson Phalarope | o | o | | |
| Glaucus-winged Gull | | | r | r |
| California Gull | | o | o | |
| *Ring-billed Gull | a | a | a | a |
| *Forster's Tern | u | u | | |
| Caspian Tern | o | o | | |
| *Rock Dove Pigeon | c | c | c | c |
| *Mourning Dove | c | c | c | u |
| Long-eared Owl | o | o | | |
| *Screech Owl | o | o | o | o |
| *Barn Owl | o | o | o | o |
| *Great Horned Owl | o | o | o | o |
| Burrowing Owl | o | o | | |
| *Common Nighthawk | o | c | o | |
| Rufous Hummingbird | | o | | |
| *Belted Kingfisher | u | u | u | u |
| *Red-shafted Flicker | c | c | c | c |
| Downy Woodpecker | | | | o |
| Hairy Woodpecker | | | | o |
| *Eastern Kingbird | c | c | c | |
| *Western Kingbird | c | c | c | |
| Horned Lark | o | o | | |
| Western Wood Peewee | o | o | | |
| Violet-green Swallow | o | | | |
| *Bank Swallow | c | c | o | |
| Rough-winged Swallow | u | u | | |
| *Barn Swallow | u | c | u | |
| *Cliff Swallow | c | a | c | |
| *Black-billed Magpie | a | a | a | a |
| *Common Raven | c | c | c | c |
| *Common Crow | c | c | c | c |
| Black-capped Chickadee | | | u | u |

| | S | S | F | W |
|---|---|---|---|---|
| ___ Brown Creeper | | | | o |
| ___ *Long-billed Marsh Wren | o | o | o | |
| ___ Bewick's Wren | u | u | o | |
| ___ *Robin | a | a | a | a |
| ___ Varied Thrush | u | | u | u |
| ___ Hermit Thrush | | | | r |
| ___ Ruby-crowned Kinglet | o | | o | o |
| ___ Bohemian Waxwing | | | o | o |
| ___ Cedar Waxwing | u | | u | c |
| ___ Northern Shrike | | | | o |
| ___ *Starling | a | a | a | a |
| ___ Solitary Vireo | | u | | |
| ___ Orange-crowned Warbler | o | | | |
| ___ Nashville Warbler | o | | | |
| ___ Yellow Warbler | u | u | u | |
| ___ Audubon's Warbler | u | o | u | o |
| ___ Townsend's Warbler | o | | o | |
| ___ MacGillivray's Warbler | o | | | |
| ___ Wilson's Warbler | u | u | u | |
| ___ *House Sparrow | c | c | c | c |
| ___ *Western Meadowlark | a | a | c | c |
| ___ *Yellow-headed Blackbird | o | o | | |
| ___ *Red-winged Blackbird | a | a | c | u |
| ___ *Bullock's Oriole | c | c | | |
| ___ *Brewer's Blackbird | c | c | c | u |
| ___ Brown-headed Cowbird | u | c | u | |
| ___ Lazuli Bunting | u | u | | |
| ___ *Black-headed Grosbeak | o | o | | |
| ___ Evening Grosbeak | u | c | | a |
| ___ *House Finch | c | c | c | c |
| ___ *American Goldfinch | c | c | c | o |
| ___ Rufous-sided Towhee | a | | o | u |
| ___ *Savannah Sparrow | o | | | |
| ___ Baird's Sparrow | u | | u | u |
| ___ *Lark Sparrow | c | c | u | u |
| ___ Oregon Junco | u | | c | c |
| ___ White-crowned Sparrow | c | | c | a |
| ___ Golden-crowned Sparrow | o | | o | u |
| ___ *Fox Sparrow | u | u | | |
| ___ *Song Sparrow | c | c | c | c |
| ___ Harris' Sparrow | | | | r |

## MAMMALS

___ Mule Deer
___ Blacktailed Jackrabbit
___ Eastern Cottontail
___ Nuttall Cottontail
___ Columbian Ground Squirrel
___ Washington Ground Squirrel
___ Yellow-bellied Marmot
___ Northern Pocket Gopher
___ Great Basin Pocket Mouse
___ Ord Kangaroo Rat
___ Deer Mouse
___ Northern Grasshopper Mouse
___ Bushy-tailed Wood Rat
___ Long-tailed Vole
___ Montane Vole
___ Sagebrush Vole
___ House Mouse
___ Norway Rat
___ Beaver
___ Muskrat
___ Coyote
___ Raccoon
___ Short-tailed Weasel
___ Long-tailed Weasel
___ Badger
___ Striped Skunk
___ Spotted Skunk
___ River Otter
___ Vagrant Shrew
___ Merriam Shrew
___ Mink
___ Porcupine

## FISH

___ Bass, Largemouth
___ Bass, Smallmouth
___ Bluegill
___ Bullhead, Brown
___ Bullhead, Yellow
___ Carp
___ Catfish, Channel
___ Crappie, White
___ Gambusia (mosquito fish)
___ Pumpkin Seed
___ Sculpin
___ Squawfish
___ Sucker
___ Sturgeon, White
___ Trout, Rainbow
___ Whitefish, Northern

## REPTILES

Lizards

- ____ Salamander, Long-toed
- ____ California Rough-skinned Newt (waterdog)
- ____ Lizard, Sagebrush
- ____ Lizard, Side-blotched
- ____ Lizard, Oregon Alligator
- ____ Western Skink

Snakes

- ____ Bullsnake
- ____ Wandering Garter Snake
- ____ Desert Night Snake
- ____ Yellow-bellied Racer
- ____ Desert Striped Whipsnake
- ____ North Pacific Rattlesnake

## AMPHIBIANS

- ____ Bullfrog
- ____ Frog, Pacific Tree
- ____ Toad, Great Basin Spadefoot
- ____ Toad, Woodhouse's
- ____ Turtle, Painted

## PLANTS OF McNARY WILDLIFE PARK

- ____ Alfalfa
- ____ Asparagus, Garden
- ____ Austrian Wild Pea
- ____ Barley, Squirreltail
- ____ Beardgrass, Rabbitfoot
- ____ Bermuda Grass
- ____ Bitterbrush
- ____ Bluegrass, Rough-stalked
- ____ Broadleat Pepperwort
- ____ Bulrush, American
- ____ Bulrush, Softstem
- ____ Canary Grass, Reed
- ____ Cattail, Common
- ____ Cheatgrass
- ____ Chicory
- ____ Clematis, Western
- ____ Coreopsis, Columbia
- ____ Dock, Veiny
- ____ Dropseed, Sand
- ____ Duckweed
- ____ Elderberry, Blue
- ____ Elderberry, Coast Red
- ____ Everlasting Cottonbatting Plant
- ____ Fireweed
- ____ Fireweed, Bugloss
- ____ Foxtail, Little Meadow
- ____ Goldenrod, Canadian
- ____ Heliotrope, Salt
- ____ Hemicarpha, Western
- ____ Knapweed, Diffuse
- ____ Knapweed, Russian
- ____ Lady's Thumb, Curled
- ____ Lettuce, Prickly
- ____ Licorice Root
- ____ Lupine, Silky
- ____ Milfoil, Spiked Water
- ____ Milkweed, Showy
- ____ Millein, Common
- ____ Mustard, Jim Hill's
- ____ Needle-and-Thread Grass
- ____ Nightshade, Climbing
- ____ Onethera, White-stemmed
- ____ Queen Anne's Lace
- ____ Peppermint
- ____ Pimpernel, Water
- ____ Plantago, Buckhorn
- ____ Pondweed, Curled
- ____ Pondweed, Fennel-leaved
- ____ Poplar
- ____ Primrose, Common Evening
- ____ Quackgrass
- ____ Rabbitbrush, Gray
- ____ Rabbitbrush, Green
- ____ Red Top
- ____ Rumex, Buttered
- ____ Rush, Colorado
- ____ Rush, Coville's
- ____ Rush, Jointed
- ____ Rush, Spreading
- ____ Russian Olive
- ____ Sagebrush, Big
- ____ St. John's Wort
- ____ Scouring Rush, Common
- ____ Sedge, Clustered
- ____ Spike Rush, Creeping
- ____ Storksbill
- ____ Sunflower, Common
- ____ Sweet Clover, White
- ____ Thistle, Bull
- ____ Thistle, Russian
- ____ Verbena, Bracted
- ____ Watergrass
- ____ Water Horehound, Cut-leaved
- ____ Waterweed, Canadian
- ____ Wheatgrass, Beardless Bluebunch
- ____ Wheatgrass, Crested
- ____ Wheatgrass, Intermediate
- ____ Wheatgrass, Slender
- ____ Wild Rye, Volga
- ____ Wild Rye, Yellow
- ____ Willow
- ____ Willow-weed, Smooth
- ____ Yarrow
- ____ Yellow Spider Flower

APR 0 8 1981

# United States Department of the Interior

**FISH AND WILDLIFE SERVICE**
Area Office
2625 Parkmont Lane S.W.
Olympia, WA 98502

April 2, 1981

Nancy Gronowski, Landscape Architect
Department of Transportation
Parks and Recreation Division
525 Trade Street S.E.
Salem, Oregon 97310

Dear Ms. Gronowski:

As requested by your letter, dated March 3, 1981, I have attached a list of endangered and threatened species (Attachment A) that may be present in the area of the proposed master plan for Hat Rock State Park, Umatilla County, Oregon. The list fulfills the requirement of the Fish and Wildlife Service under Section 7(c) of the Endangered Species Act. Your Endangered Species Act requirements are outlined in Attachment B.

I have also included a list of candidate species for your information. These species are presently being reviewed by this Service for consideration as endangered or threatened. It should be noted that candidate species have no protection under the Endangered Species Act and do not require a biological assessment, but are included for your early consideration. It is possible the candidates could become formal proposals and be listed during the construction period, thereby falling within the scope of Section 7 of the Endangered Species Act. For this reason we suggest you review the potential effects your project may have on these species and consider informal consultation with this office if your project is likely to adversely impact a candidate species.

Should your biological assessment determine that a listed species is likely to be affected (adversely or beneficially) by the project, your agency should request formal Section 7 consultation through this office. Even if your biological assessment shows a "no affect" situation, we would appreciate receiving a copy of your assessment for our information.

If you have any additional questions regarding your responsibilities under the Act, please contact Mr. Jim Bottorff, Endangered Species Team Leader, (206) 753-9440, FTS 434-9440, at the following address:

U. S. Fish and Wildlife Service
Endangered Species Team
2625 Parkmont Lane S.W., Bldg. B-3
Olympia, WA 98502

In your letter you requested general information on wildlife in the Hat Rock State Park. We have responded to the threatened or endangered species aspect of your inquiry. For more comprehensive information on wildlife populations, we recommend that you contact the Ecological Services Office of the Fish and Wildlife Service in Portland, OR. We are sending a copy of this letter and yours to that office to alert them of your interests. Their address is:

U. S. Fish and Wildlife Service
Ecological Services
Portland Field Office
727 N.E. 24th Ave.
Portland, OR 97232

Your interest in endangered species is appreciated.

Sincerely,

Margaret I. Kalar

for Joseph R. Blum
Area Manager

Attachments

cc: Regional Director, Portland, OR (AFA-SE)
ES, Portland, OR
Oregon Dept. of Fish & Wildlife
Attn: Frank Newton
Oregon Natural Heritage Program

LISTED AND PROPOSED ENDANGERED AND THREATENED
SPECIES AND CANDIDATE SPECIES THAT MAY OCCUR
WITHIN THE AREA OF THE PROPOSED
MASTER PLAN FOR HAT ROCK STATE PARK,
UMATILLA COUNTY, OREGON
NUMBER 1-3-81-I-76

LISTED

Bald Eagle (Haliaeetus leucocephalus)

PROPOSED

None

CANDIDATE

The following are plant species--
Allium robinsonii
Arenaria franklinii var. thompsonii
Rorippa columbiae

A field check will be necessary to determine the presence of these species. This is particularly true for the first two whose habitats have been substantially reduced due to the effect of dams on the Columbia River. These species may be extinct in Oregon.

ATTACHMENT B

FEDERAL AGENCIES' REQUIREMENTS UNDER SECTION 7(c)

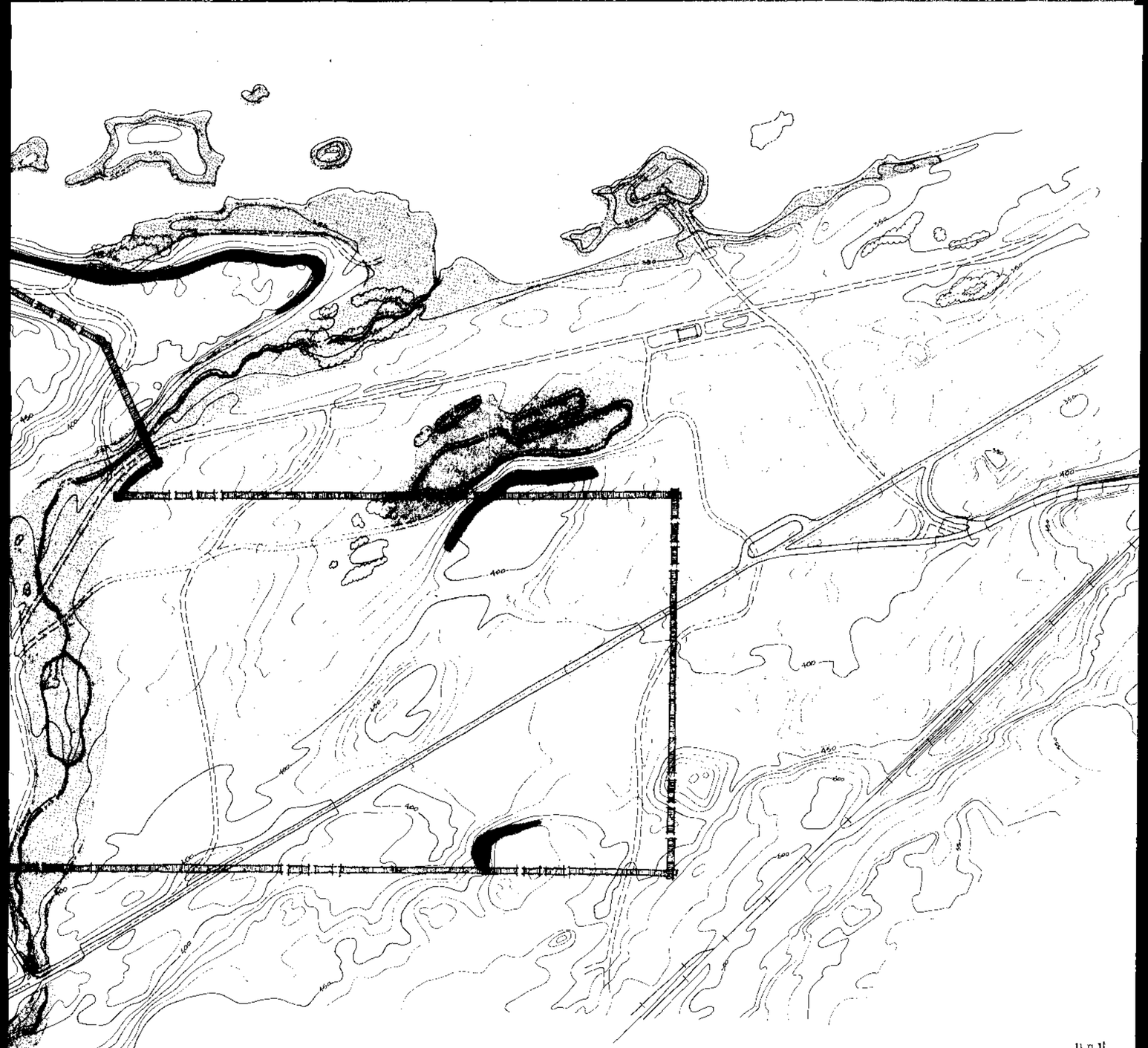
Biological Assessments

This process is initiated by a Federal agency in requesting a list of proposed and listed endangered and threatened species that may be within the area of a construction project.[1] The purpose of the assessment is to identify any proposed and/or listed species which are/is likely to be affected by a construction project. When present in the project area, proposed species are included on the list even though they do not have legal protection under the Act. Their inclusion recognizes that they may be listed at anytime and have the portent to cause delays or modifications to the proposed action. In light of this, we recommend that those species be included in the biological assessment. The assessment should be completed within 180 days after initiation of the assessment (or within such a time period as is mutually agreed to by our two agencies). The assessment should begin within 90 days after receipt of the species list or a new list should be requested. No irreversible commitment of resources is to be made during the biological assessment process which would result in violation of your requirement under Section 7(a) of the Act. Planning, design, and administrative actions may be taken by your agency; however, no construction may begin.

Your agency should conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species. Review literature and scientific data to determine species distribution, habitat needs, and other biological requirements. Interview experts including those within Fish and Wildlife Service, National Marine Fisheries Service, State conservation departments, universities and others who may have data not yet published in scientific literature. Review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat. Analyze alternative actions that may provide conservation measures. At the conclusion of the assessment as described above, the Federal agency shall prepare a report documenting the results. The report shall also include a discussion of study methods used, any problems encountered, and other relevant information. The report should be forwarded to this office.

---

1/ "Construction Project" means any major Federal Action which significantly affects the quality of the human environment designed primarily to result in the building or erection of man-made structures such as dams, buildings, roads, pipelines, channels, and the like. This includes Federal actions such as permits, grants, licenses, or other forms of Federal authorization or approval which may result in construction.



400' 800' 1600'
125m 250m 500m

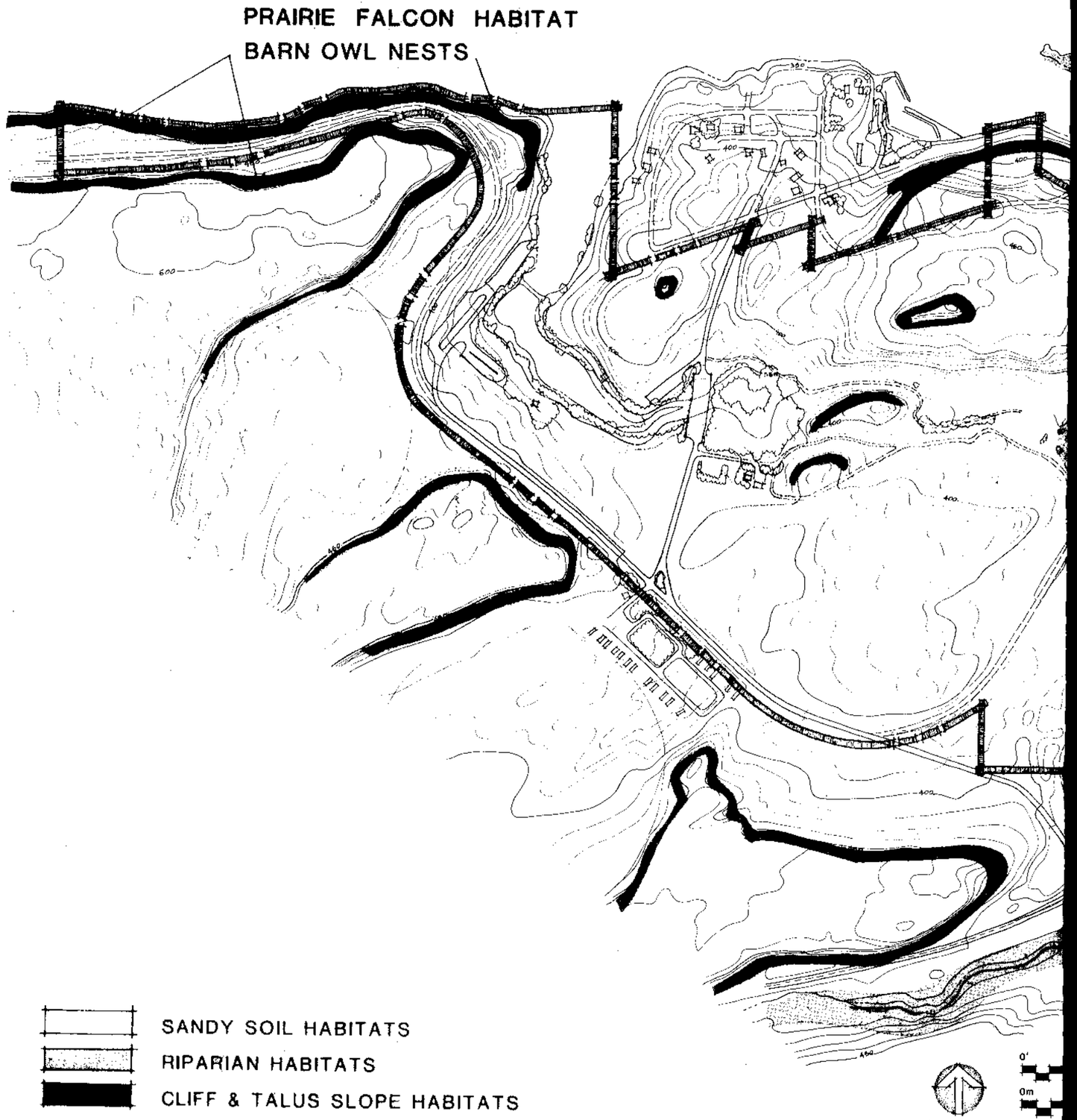
# HAT ROCK STATE PARK

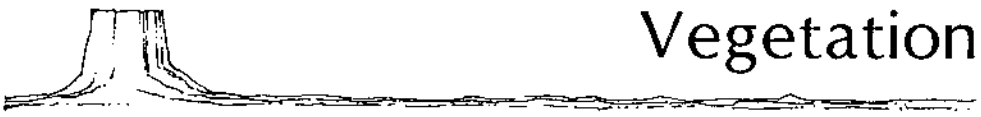
UMATILLA COUNTY, OREGON

Date: Revised:

5.48

WILDLIFE


PRAIRIE FALCON HABITAT
BARN OWL NESTS
SANDY SOIL HABITATS
RIPARIAN HABITATS
CLIFF & TALUS SLOPE HABITATS
0'
0m



# Vegetation

# Vegetation

## NATIVE VEGETATION

An ecological zone is a specific habitat made up of interrelated parts. The climate, the soils, the plants, animals and insects are all part of an ecological zone. Soils and climate help in determining which plants grow and thrive. Plants in turn are one of the factors which determine the kinds of animals found in the zone. Within each ecologic zone is found a major plant community made up of specific types and species of plants which grow in those habitat conditions.

Hat Rock State Park lies within the ecological zone known as the Shrub-Steppe zone. A steppe is a perennial grassland. This zone has a desert-like environment where big sagebrush (Artemisia tridentata) and perennial grasses are equally dominant. Other plants which occur within this community and which are commonly found at Hat Rock include the following: Carey's balsam root (Balsamhoriza careyana), bitterbrush (Purshia tridentata), douglas or green rabbitbrush (Chrysothamnus viscidiflorus), rubber or gray rabbitbrush (C. nauseous), and stiff sagebrush (Artemisia rigida).

Once plant communities are established and reach a stage of self-perpetuation, they are usually permanent unless disturbed by outside forces. At Hat Rock, there is evidence that the natural community has been disturbed by non-natural occurances. The principal agents for change in the shrub-steppe zone are usually fire and overgrazing. This allows for the introduction of non-native plants which can become abundant if conditions are favorable.

The principle invaders in shrub-steppe zones are cheatgrass brome (Bromus tectorum), Kentucky bluegrass (Poa pratensis) and medusahead wildrye (Elymus caput-medusae).

Prior to the settlement of this area by pioneers, there was little natural disturbance from grazing or from fire. The plant community was very stable and self-maintaining. Much of this original plant community remains at Hat Rock, although the effects of man can be seen in the large areas of cheatgrass throughout the park and the areas where recent fires have removed portions of the large shrub vegetation.

The reasons for these changes in the plant community have been well documented in Natural Vegetation of Oregon and Washington, Franklin and Dyrness, 1973. In general, these changes occur for the following reasons:

Fire

The big sagebrush (Artemisia tridentata) and bitterbrush (Purshia tridentata) are sensitive to fire damage and may take years to recover to their prior levels. In the dry and windy conditions at Hat Rock, fire can be a serious problem. (The big sagebrush plays a number of important roles in the ecology of the Shrub-Steppe zone. It protects the perennial grasses and may be a key reason why there is still grass remaining in grazed rangelands. It uses water which is below the roots of the grasses, thus utilizing the water resource which would not otherwise be used. It acts to extend the depth of the soil profile involved in nutrient cycling. It also provides valuable habitat for birds.)

Grazing

Although fire has little long term effect on the large perennial grasses such as bluebunch wheatgrass (Agropyon spicatum) and Idaho fescue (Festuca idahoensis), grazing can seriously damage these natives. They will rarely return to their former status after severe overgrazing.

Non-Native Plants

After the non-native cheatgrass and bluegrass have become established in the Steppe regions, they are fairly permanent. Generally, the native species will only become reestablished with the aid of human intervention. Cheatgrass has now become so common that it is an element of the plant community even on undisturbed sites.

In addition to the major plant community found at Hat Rock, there are other smaller plant communities found in the small but important habitats located in other areas of the park. These habitats include the following:

1) The upper levels of the rock outcroppings, i.e. the tops of such formations as Hat Rock and Boat Rock, where there is more exposure to wind and weather and the soil is likely to be thin.

2) The sides of these rock outcroppings when there is also little soil but less exposure to weather and wind.

3) The steep, rocky talus slopes at the base of these outcroppings.

4) The valleys or draws which are protected to a degree and which may receive more moisture.

5) The marshy wetland areas along the Cold Springs Wash and the ponds north of the State's BLM land.

6) The areas along the edge of the Columbia River and the arm of the river which comes into Hat Rock.

7) The areas along the old railroad right of way which may be less disturbed than surrounding areas.

As discussed earlier, the naturally occurring plant communities at Hat Rock are susceptible to disruption and are slow to recover since growing conditions are harsh.

If the communities are disrupted, the tendency is for single species of non-native plants such as cheatgrass to invade and predominate. This results in loss of diversity of habitat and results in a simpler, less valuable community of plants. Consideration needs to be given to the changes which will occur when development alters the existing condition of the landscape.

Most of the naturally occuring plants at Hat Rock are forbs and low growing shrubs. Occasionally, trees such as cottonwood, river willow and russian olive are found growing among the riparian habitats. Some wetland areas also support fairly large areas of reeds and cattails. An occasional isolated juniper may be found growing in the upland region of the park.

For the greater part of the year, the predominant color of the vegetation is gray or gray-green, but during the spring when the wildflowers are blooming, pink, yellow and purple flowers provide vibrant color on the sandy soil.

## VEGETATION IN DEVELOPED AREAS

Many areas of Hat Rock have been developed and the vegetation altered to provide conditions conducive to human comfort. These changes have occurred primarily around the Hat Spring impoundment, the picnic areas and the manager's residence. The primary change has been to provide shade trees and grass. These are irrigated to ensure that they will survive the dry conditions.

The area around the manager's residence has been landscaped and screened from the adjacent picnic area by a hedge of arborvitae.

An area between the manager's residence and the road has also been screened. This area was used at one time as a nursery to start trees and shrubs for eventual use in other parks. In the future, this area may be used as an additional picnic area.

Plant materials which have been introduced to provide for human comfort at Hat Rock and which have succeeded, include black locust trees (Robinia pseudoacacia) and russian olive trees (Elaeagnus angustifolia). Large areas of lawn have also been introduced and do well when properly irrigated.

## RARE AND ENDANGERED SPECIES

The Department of the Interior, Fish and Wildlife Service, Endangered Species Office was contacted regarding endangered and threatened species that may occur in the park. A check of the Federal Register, where all endangered and threatened species are listed, revealed that there were no listed or proposed species, but there were three candidate species. These plants do not have official protection at this time, but they are under consideration and may be placed on the list at any time. The plants are Allium robinsonii - Robinson's onion; Arenaria franklinii var. thompsonii - Franklin's sandwort, a low growing flowering plant; and Rorippa columbiae - a member of the cress family whose plants grow generally in water or in wet places.

The Oregon Native Plant Society and others have conducted various field trips at Hat Rock and noted areas where endangered species might be found. These include the draw east of the existing picnic area and southwest of Boat Rock and the area within the right of way of the old railroad bed. Searches for endangered and threatened species of plants have not turned up any to date.

SOURCES:

Natural Vegetation of Oregon and Washington, Franklin and Dyrness, USDA Technical Report, PNW-8, 1973.

Department of Biology, Blue Mountain Community College, Pendleton, Oregon.

Range Plants, Cooperative Extension Service, Oregon State University, Corvallis, Oregon.

Plant Communities, Daubenmire, Rexford, Harper & Row, New York, 1968.

Northwest Plant Names and Symbols for Ecosystem Inventory and Analysis. 4th Ed., USDA Technical Report PNW-45, 1976.

National Register, Part IV, Dept. of the Interior, Dec. 15, 1980.

## VEGETATION MANAGEMENT NOTES

Care should be taken to protect the native plants and their habitats.

If rare or endangered species are encountered, notification must be made to the proper authorities and steps taken to ensure adequate protection. For further discussion on this process, see WILDLIFE, Management Notes.

Plants which are introduced into the landscape must be carefully selected in order to ensure their success in the hot, dry and windy climate here. Plants which will be introducted generally will be in areas of new development or in areas of existing use when rehabilitation is occuring. Since these areas are probably irrigated, many plant species will prove acceptable. A list of plants which are hardy in dry climates is attached for future consideration.

## DROUGHT TOLERANT PLANTS

From the Sunset New Western Garden Book, Lane Publishing, 1979.

| Scientific Name | Common Name |
|---|---|
| **Trees** | |
| Albizia julibrissin | Silk Tree |
| Celtis occidentalis | Common Hackberry |
| C. reticulata | Western Hackberry |
| Robinia (all species) | Locusts |
| Tilia tomentosa | Silver Linden |
| Ulmus pumila | Siberian Elm |
| **Shrubs** | |
| Artemisia | Native Sagebrush (includes all species) |
| Caragana arborescens | Siberian peashrub |
| Cercis occidentalis | Western redbud |
| Cercocarpus (many species) | Mountain mahogany |
| Cotinus coggygria | Smoke tree |
| Cotoneaster (many species) | Cotoneaster |
| Elaeagnus augustifolia | Russian olive |
| E. commutata | Silverberry |
| E. multiflora | Cherry elaeagnus |
| Mahonia aquifolium | Oregon Grape |
| Pyracantha coccinea | Firethorn |
| Rosa rugosa | Rugosa rose |

## Columbia Basin Province

The Columbia Basin is the largest single province; it occupies an extensive area south of the Columbia River between the Cascade Range and Blue Mountains in Oregon and roughly two-thirds of the area east of the Cascades in Washington. Topography varies from very gently undulating to moderately hilly. Steep slopes are of limited occurrence and restricted to isolated basaltic buttes or canyons cut by some of the major rivers; for example, the Deschutes River in Oregon (fig. 16). Over most of the area, elevations range from 300 to 600 meters, although they are less than 150 meters adjacent to the Columbia River.

Although early Tertiary rocks are found at scattered locations in Oregon, the important geologic events in the Columbia Basin Province began during the Miocene epoch with the vast outpouring of lavas making up the Columbia River Basalt formation. This huge basalt layer covers over 500,000 square kilometers in Washington, Oregon, and Idaho and underlies virtually the entire province. The Columbia River Basalt formation, ranging in total thickness from 600 to over 1,500 meters, is made up of numerous individual flows about 8 to 30 meters thick. Bottom portions of individual flows are dense, dark-gray basalt, but near upper margins the basalt becomes scoriaceous. In some areas, deformation of the Columbia River basalt produced ridges and hills during the Pleistocene epoch.

In the central portion of eastern Washington's Columbia Basin Province is a unique geologic feature—the Channeled Scablands. This is a gigantic series of dry, deeply cut channels in Columbia River basalt (fig. 17) which form an extensive and complex drainage

network. Many of the deeply entrenched drainageways diverge upstream only to converge again further downstream. Perhaps the best known feature in the Channeled Scablands is Grand Coulee with its spectacular Dry Falls. Although the origin of these puzzling features is still debated, Bretz (1959) probably offered the most satisfactory theory. He suggests that floodwaters, pouring from glacial Lake Missoula (western Montana) as a result of dam failure during the Pleistocene epoch, were responsible for cutting the channels.

Plio-Pleistocene deposits cover the Columbia River basalt over extensive areas. The most widespread deposit is the Palouse loess which mantles an elliptical area 160 kilometers long in southeastern Washington. This material, deposited during the Pleistocene epoch, is made up of massive, tan-colored silt which may be over 45 meters thick. The Palouse area is characterized by smoothly rolling hills (fig. 18) and soils of high fertility which are generally used for wheat and pea production. Similar buff-colored, structureless silt deposits are found in Oregon near Moro and in Grass Valley. In addition, a large area near Boardman, Oregon, is underlain by unconsolidated sand apparently of Pleistocene age. Similar deposits, probably glaciolacustrine in origin, are located west of Walla Walla and near Toppenish, Washington.

Although virtually all soils in the Columbia Basin Province have been formed under grassland or shrub-grassland vegetation, a wide variety of soils is present. Most of the broad soil differences correlate with annual precipitation. In general, precipitation is heaviest along the margins of the basin and gradually decreases toward the central portion.

**Figure 18.—Rolling Palouse Hills, composed of deep loess deposits, near Pullman, Washington, Columbia Basin Province** *(photo courtesy H. W. Smith).*

As a result, four distinct soil regions, forming a roughly concentric circular pattern, may be identified within the province.

The first soil region is located along all Columbia Basin Province boundaries with the exception of the west but is best expressed in the Palouse Hills near the Washington-Idaho border. The climate is subhumid, with annual precipitation ranging from 400 to 600 millimeters. In this area Argixerolls predominate; under the old classification system, these soils were classed as Prairie soils and Chernozems. Argixerolls derived from Palouse loess showing maximum profile development (Prairie soils) possess a thick, dark-colored A1 horizon of silt loam texture overlying a clay loam or silty clay loam B2 horizon having well-defined prismatic structure. Typically, calcium carbonate has been leached to levels well below the base of the solum. Less well-developed soils on loess (Chernozems) generally have shallower profiles, less clay accumulation, and subangular blocky structure in the B2 horizon and a zone of calcium carbonate in the B3, usually within 1 meter of the soil surface. Other soils encountered in this region include Haploxerolls (Chestnut and Brown soils), Albaqualfs (Planosols), Haploxeralfs (Noncalcic Brown soils), and Xerorthents (Regosols).

The second soil region is adjacent but generally at lower elevations and more arid, receiving 230 to 400 millimeters of annual precipitation. The principal soils are Haploxerolls (Chestnut soils) derived from loess. Typically, these soils have moderately thick, brown silt loam A1 horizons over light-brown silt loam B horizons with incipient prismatic structure. A zone of calcium carbonate accumulation commonly is present in the B3 horizon. Other soils present in smaller amounts include Argixerolls (Prairie soils), Durixerolls (Prairie soils with hardpan), Xerorthents (shallow; Lithosols), and Rockland.

The third soil region roughly encircles the central portion of the basin and also is semiarid with 230 to 400 millimeters of annual precipitation. Parent materials are principally loess and sandier windblown materials with lesser amounts of basalt. Poorly developed Haploxerolls (Brown soils) are the most common soils in the region. They possess a moderately thick, dark grayish-brown, loam-textured A horizon which is low in organic matter content. B horizons show little clay accumulation and a B3ca is generally present. Xerorthents (shallow; Lithosols) are also common in this region since it encompasses a large portion of the Channeled Scablands. Other soils of some importance include Camborthids (Sierozems), Argixerolls (Prairie soils), Haplargids (Sierozem and Desert soils), Haplaquolls (Humic Gley soils), Durixerolls (Prairie soils with hardpan), and Rockland.

The fourth soil region includes desertic soils of the lower bowllike center of the Columbia Basin Province. This is an area of arid climatic conditions receiving 100 to 230 millimeters of precipitation annually. Here, the dominant soils are Camborthids (Sierozems). These soils have thin, light-colored A horizons over B horizons which may be darker than the A and usually contain larger amounts of clay. A carbonate-enriched horizon, that may be cemented, occurs in the lower part of the B horizon. Other soils present include Haploxerolls (Chestnut and Brown soils), Xerorthents (shallow; Lithosols), Haplargids (Sierozem and Desert soils), Haplaquolls (Humic Gley soils), Torripsamments (Regosols), and Rockland.

# Steppes

Steppe and shrub-steppe occupy the basins in the rain shadow east of the Cascade Range (fig. 27). This is a region characterized by bunchgrasses (e.g., *Agropyron spicatum*, *Festuca idahoensis*, *Poa sandbergii*) and sagebrushes (e.g., *Artemisia tridentata*, *A. arbuscula*, and *A. rigida*). The vegetation of all or portions of this area is often referred to as desert, high desert, northern desert shrub, Great Basin desert, desert scrub, or by similar designations; as Daubenmire (1970) points out, "a combination of hot dry summers . . . rattlesnakes, horned lizards, tarantulas, and cacti seem to evoke this [a desert] classification. . . ." Daubenmire (1970) goes on to suggest that steppe is the more appropriate term based on existence of an appreciable cover of perennial grasses on zonal soils. Shrub steppe and meadow steppe are physiognomic subdivisions of steppe (perennial grassland) in which there are conspicuous (but discontinuous) layers of shrubs and a high proportion of broad-leaved forbs, respectively.

In figure 27, we have divided the steppes into three major units (plus a fourth unit of forest-steppe transition—the *Juniperus occidentalis*): (1) steppe, i.e., without *Artemisia tridentata* as a component; (2) shrub-steppe in which *Artemisia tridentata* and perennial grass codominate; and (3) desert shrub. Earlier, Franklin and Dyrness (1969) referred to "steppe (without shrubs)" but, as Daubenmire (personal communication) has pointed out, almost all the perennial grasslands in the Northwest have at least some shrub component. So defined, steppe is found primarily around the eastern rim of the Columbia basin (fig. 27). Shrub-steppe occupies the center of the Columbia basin and most of arid central and southeastern Oregon. Desert shrub is found only in isolated localities in southeastern Oregon.

Because of the information available, we have broken our treatment of the steppe and shrub-steppe into geographic units: the Columbia Basin Province (Chapter VIII) and central and southeastern Oregon (Chapter IX). General information on both regions is found in Chapter VIII.