Paskenta and Newville Service Areas

Acreage grouping	Number of Individuals	Number of Corporations	Total acres	Excess land
5-10	17	0	143	0
11-50	25	1	820	0
51-100	15	1	1,125	0
101-160	12	0	1,626	0
161-320	17	0	3,757	0
320+	6	1	4,754	2,674
Total	92	3	12,225	2,674

The excess land is 2,674 acres, or 22 percent of the arable lands. Indications are that the largest holding of excess land would be divided among the members of the family at the time the project is built, which would substantially reduce excess land holdings to 1,862 acres or 15 percent of the arable lands.

Type of farm. With unit development and the generally favorable soil and climatic factors, a stable and prosperous agricultural economy similar to that of the adjoining area to the east would result. In common with other portions of the Central Valley of California, farmers in the service area would be in a position to choose among a relatively wide variety of proven crops.

Customs, land use, and resources would keep the area basically in the production of livestock products, with lesser emphasis on other crops such as orchards.

The crop pattern with development of the unit, as shown in table 9, would make use of the firm ground-water supply, as well

Table 9. Future land use, and relationship between land classes and assigned farm budgets

Farm budget for land class	Crop projected	With the unit	Without the unit
		(acres)	
Irrigable		11,500	11,500
1	Almonds	3,800	
2	Field crops	4,100	312[a]
3	Irrigated pasture	3,600	
Composite	Dry farmed		11,188

[a] Based on available firm ground-water supply.

Note: Future studies of Paskenta-Newville Unit would include a complete reexamination of the land use projections and farm budget analysis for local irrigation service, including then current criteria, for both benefit and payment capacity evaluations.

as project water. Farm type would change from dryland grazing to the growing of almonds, field crops, and irrigated pasture.

Crop yields. Crop yields used in the farm budgets were determined through study of primary and secondary data collected in the field and from published material. Major sources of data were the University of California Extension Service, the County Agricultural Commissioners' Reports, and interviews with farmers and farm advisors.

In determining the yield for tree crops, a mature orchard was assumed. An orchard generally requires 7 to 12 years to attain maturity, depending on tree type, and environmental conditions.

Yields arrived at for all crops are considered representative of yields achieved with adequate fertilization and spray programs, and proper management.

Farm markets. Major markets for perishable agricultural products exist in the Sacramento metropolitan area, and in the San Francisco Bay area. These areas are readily accessible over excellent rail and highway facilities.

Established processing facilities for specialty crops such as almonds, tomatoes, and sugar beets are readily available in local or nearby communities. Meat animals are generally shipped to the Stockton yards and to the Bay Area for slaughter and processing, although small slaughter houses exist in the general area.

Land values. Recent sales transactions in the general area were examined at the Tehama County Recorder's Office. For 21 transactions, dated 1958 through 1964, values ranged from $55 to $1,500 per acre. This extreme may be due to the wide range in land use and land quality, water availability, and buildings and tree crops involved. Raw lands suitable for irrigation farming are currently priced in the $250-$400 per acre range.

Development period. The transition from dryland to irrigated farming on the irrigable land would require about 10 years for the bulk of the land after adequate water supplies were available; some development might be deferred for a longer time.

Local Irrigation Benefits

Irrigation benefits are monetarily evaluated in two categories--direct and indirect benefits. Direct irrigation benefits represent the increase in net farm income made possible by delivery of project water, and are derived by the farm budget analysis under conditions with and without the project. Indirect benefits measure the increase in net incomes of persons other than farmers which results from unit development.

Direct irrigation benefits. Direct benefits from irrigation, measured by the increase in net farm income, including the operators' labor and management earnings, were calculated from summaries of farm budgets. Direct irrigation benefits under conditions of full development would be as shown in table 10.

Table 10. Irrigation benefits by farm budgets (full development)

With Paskenta-Newville Unit

	Almonds, class 1 and 2	Field crops, class 2	Beef on irrigated pasture class 3	Service area
Size of farm (acres)	120	320	240	--
Net farm income	$25,699	$28,815	$21,113	--
Projected acres	3,800	4,100	3,600	11,500
Net farm income	$813,887	$369,120	$316,695	$1,499,702

Without the unit

	Field crops	Small grain	Service area
Size of farm (acres)	320	1,280	--
Net farm income	$28,815	$ 2,861	--
Projected acres	312[a]	11,188	11,500
Net farm income	$28,239	$24,891	$53,130
Difference due to unit			$1,446,572

Recapitulation

	Total	Per acre	Per acre-foot[b]
Direct benefits	$ 1,447,000	$125.83	$ 39.70
Indirect benefits	627,000	54.52	17.20
Total	$ 2,074,000	$ 180.35	$ 56.90

[a] Irrigated from available ground-water supply.

[b] 36,450 acre-foot farm delivery.

Indirect irrigation benefits. Indirect irrigation benefits result from movement of additional farm products through channels of industry and trade. Indirect benefits of $627,000 annually under full development would be attributable to the unit from the local service area.

Total annual irrigation benefits. The total annual irrigation benefits of the local Paskenta-Newville service area would be $2,074,000, resulting from a delivery of 36,450 acre-feet of project water at the farm. Thus, the total benefits would average $56.90 per acre-foot delivered at the farm.

Intangible irrigation benefits. Intangible irrigation benefits are those benefits not susceptible of monetary measurement, but are nevertheless real and significant to the general welfare. The maintenance and improvement of the local level of living would be one intangible benefit. Other such benefits would include the increase of employment opportunities afforded local laborers and skilled workers; the improvement in services rendered by schools, libraries, and hospitals; the enlargement of the tax base, and the contribution to an expanding local and national economy.

Local Interest

Local interests, both individuals and organized groups, have furnished letters and resolutions evidencing their interest in and support for a multipurpose flood control project on Thomes Creek. Resolutions have been received from the California

Legislature, Willows Chamber of Commerce, Glenn County Chamber of Commerce, Glenn County Supervisors, the Orland District Chamber of Commerce, Jacinto Grange No. 431, Tehama County Supervisors, and the Superior California Water Association.

Export Water Supply

The balance of the project yield, amounting to some 400,000 acre-feet annually, would be available in the Delta Pool. For economic justification purposes, irrigation benefits are a representative, but conservative measure of value for this water supply.

Irrigation benefits which could result from this yield are based on an average of the agricultural benefits determined in previous agricultural studies for areas served by Central Valley Project water supplies. These are the San Luis, San Felipe and Delta-Mendota service areas and benefits average about $123.00 per acre-foot measured at the farm. Of this amount, about $66.00 per acre-foot is direct benefits, and $57.00 per acre-foot is indirect benefits. Indirect benefits are relatively high because of the preponderance of cotton and vegetable crops, with their intensive processing and marketing requirements. As the project facilities that are used in the cost estimates for the export yield include only storage and conveyance facilities to the Delta, the benefits were adjusted for the estimated conveyance and distribution and drainage costs from the Delta to the farm.

The annual benefits, when adjusted for these costs, amount to $103.00 per acre-foot. A 25-year filling period would be required to obtain the optimum export yield of 400,000 acre-feet, or an annual equivalent water yield of 233,000 acre-feet for the 100-year period of analysis. The annual equivalent irrigation benefits amount to $23,999,000, of which $10,718,000 is direct benefits, and $13,281,000 is indirect benefits.

A summary of the annual equivalent irrigation benefits for both the local and export water follows:

	Annual equivalent service (ac.ft.)	Benefits per acre-foot		Total benefits	
		Direct ($)	Total ($)	Direct ($)	Total ($)
Local	30,800	39.69	56.89	1,220,944	1,752,212
Export	233,000	46.00	103.00	10,718,000	23,999,000
Total				11,938,944	25,751,212

FLOOD CONTROL

The Corps of Engineers, U.S. Army Engineer District, Sacramento, California, determined the facilities that would be needed and the benefits that could be derived by including flood control as a unit function.

The Corps of Engineers has recommended that 80,000 acre-feet of controlled storage with a maximum release of 5,000 cubic feet per second to Thomes Creek be included in the unit to protect against floods of approximately once-in-50-year frequency. The

design and proposed operation also provide major reduction in the peak flows of all larger floods. Minor channel and levee work on Thomes Creek would be required for optimum flood control. This could be accomplished under the Corps' authorized Sacramento River Major and Minor Tributaries Project.

Benefits derived from operation of the reservoir under the recommended criteria would equal $610,000 per year. Benefits would primarily be attributed to reduction of damages along Thomes Creek, with lesser benefits accruing from protection afforded to the Sacramento River below Thomes Creek and the Butte Basin. The Newville operation would also provide some incidental control of floods from North Stony Creek, thus supplementing existing control of Stony Creek by the Corps' Black Butte Reservoir.

Appended to this report is a letter dated March 1, 1966, from the Corps of Engineers containing its recommendations on the unit flood control function.

RECREATION

The recreation potential of the Paskenta-Newville Unit has been evaluated by the Bureau of Outdoor Recreation in its report dated November 1967. The Bureau of Outdoor Recreation worked closely with the U.S. Forest Service, the Bureau of Land Management, and the State of California in the development of the recreation plan.

The main body of lands, 3,885 acres, recommended for recreation development is located around the western half of Paskenta

Reservoir, and along the southwestern shore of Newville Reservoir. Most of the lands are in private holdings; the remainder are government lands under the Bureau of Land Management's jurisdiction. The U.S. Forest Service now provides limited camping facilities; hunting is the major outdoor recreation attraction.

Several bodies of water are now available for recreation within a 30-mile radius of the Paskenta-Newville Unit. These include the Red Bluff Reservoir of the Bureau of Reclamation, Black Butte Reservoir of the Corps of Engineers, and Stony Gorge and East Park Reservoirs of the Orland Project. The Sacramento River is near the eastern edge of the unit. These facilities and the river generally meet the present local outdoor recreation demand.

The Paskenta-Newville Unit would provide for the increased local demand for outdoor recreation and the demand developing in large metropolitan areas like San Francisco Bay area and the Sacramento area. The unit would provide facilities for boating, fishing, swimming, picnicking, riding, hiking, and camping. Existing unimproved roads and stock trails within the National Forest could be used for riding and hiking.

During the early years, potential recreation use with reservoir development is estimated to be 137,000 general recreation days. As the population increases, and with improvements in highway access, and the increases in leisure time and family income,

the general recreation use would increase to 667,500 days by the year 2025. The value of a recreation-day is estimated to be $1.00.

Development of recreation facilities at the reservoirs would cost $4,993,000, in addition to $520,000 for 3,885 acres of land. Facilities estimated to cost $1,416,000 would be needed immediately and the remaining facilities would be built at 10-year intervals to year 2025, thus providing for the increasing recreation use. The annual operating cost for the initial facilities would be $70,200; this cost would increase to $295,200 annually by year 2025. The initial facilities for recreation would also provide for the use associated with fish and wildlife.

The Bureau of Outdoor Recreation has recommended that the proposed recreation development area be operated by the U.S. Forest Service.

Annual equivalent recreation benefits attributable to the Paskenta-Newville Unit are estimated to be $256,500.

Benefits not given a value in this report but which are also important include the generation and growth of local businesses such as concessions, stores, motels, restaurants, and gas stations operated on or adjacent to project lands. A body of water in an area normally lacking water for a major portion of the year and the scenic vistas afforded by the impoundments and the adjacent mountain range would be of great esthetic value.

Public use and enjoyment of this natural area would be preserved for future generations.

FISH AND WILDLIFE

The Bureau of Sport Fisheries and Wildlife has evaluated the effect of the Paskenta-Newville Unit on fish and wildlife resources, in its memorandum report dated May 18, 1967, appended.

As the Paskenta Reservoir site is used as a wintering area by the Alder Springs deer herd inundation of the area would result in an annual loss of 5,000 hunter-days. To offset the loss of winter deer range, 2,680 acres of private land would be acquired in fee-title and about 650 acres would be developed. The area would be managed to support wildlife with a program developed cooperatively by the U.S. Forest Service, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife. The Bureau of Sport Fisheries and Wildlife has recommended that the mitigation lands be administered by the U.S. Forest Service. Of the 2,680 acres of land to be acquired, 225 acres would also be used as reservoir operation land. An initial cost of $33,000 would be required for development, with a subsequent maintenance cost of $7,500 annually.

Project effects on small game and waterfowl would be beneficial, and benefits would increase respectively to $2,000 and $1,050 annually by year 2025.

Fishery would be established in Paskenta and Newville Reservoirs. Preproject chemical treatment of the reservoir sites and upstream drainage areas, fish stocking, and provision of angler facilities including parking areas, sanitary facilities,

and boat launching ramps would be required. An initial cost of $15,000 would be required to eradicate undesirable rough fish and to restock. Annual use would increase from 2,550 to 107,000 angler-days during full project operation.

Annual equivalent fish and wildlife benefits are estimated at $68,300 for Paskenta-Newville Unit.

The California State Department of Fish and Game has recently questioned the mitigation plan for winter range for the Alder Springs deer herd as used in this report. A new evaluation of mitigation requirements for the Alder Springs deer herd would be required during future feasibility studies. A change in mitigation requirements could necessitate a major revision in the present plan of development.

WATER QUALITY AND VECTOR CONTROL

The possible need for water quality control measures in connection with the plan of development for the Paskenta-Newville Unit has been evaluated by the Federal Water Pollution Control Administration, now the Environmental Protection Agency.

The appended report by that agency indicates that storage in unit reservoirs for streamflow regulation would not be required for quality control, but provision of multilevel outlets for both reservoirs should be considered.

Operation of this unit in conjunction with the Central Valley Project will avoid deterioration of Delta water quality.

The long-term carry-over storage in Newville Reservoir would not appreciably affect water quality.

The Public Health Service of the Department of Health, Education and Welfare has evaluated the public health aspects dealing with sanitation measures related to recreational facilities, and potential vector problems.

PROJECT FORMULATION

The Paskenta-Newville Unit, proposed as a part of the Central Valley Project, would be integrated with and complementary to the project. It would contribute to the full development of the Central Valley Basin and enhance the possibilities for future development in the basin. It would be a logical step in planning for maximum development and use of the basin's water and related land resources. It would constitute the maximum economic level of development justified at this time with opportunities for integration with succeeding steps in resource use.

In the plan selection, present and future needs of the area were considered and established plan formulation procedures were followed. Each project function and each segment of the unit plan were analyzed to insure that benefits for the function or segment compared favorably with the cost of including it in the plan and that maximization of benefits over costs was achieved. The analyses which were made agree with the principles as outlined in Senate Document 97.

The Paskenta-Newville Unit would serve the functions of irrigation, municipal and industrial water, flood control, recreation, and fish and wildlife enhancement.

The concept evolved in formulation of the plan requires a large reservoir to store seasonal flows for infrequent releases. The Central Valley Project reservoirs in normal and wet years now spill water that is wasted to the ocean. This water could be used and a firm yield provided in dry years if carryover storage were available. The Paskenta-Newville Unit would store local inflow and act as a bank for water, releasing water in dry years to supply Central Valley Project demands. It would also supply local needs on an annual basis.

Selected Plan

The needs and resources of the area were evaluated and potential project functions selected. The selected functions included water supply, flood control, fishery, and recreation. Other functions which would receive incidental benefits, but would not require special project facilities, include power and water quality control. These functions are described in the paragraphs which follow.

Irrigation. In service area selection, factors considered were the overall areas in need of water, ground-water basins, topography, and limits of arable lands. Consideration of these factors led to the establishment of two areas to be served.

Local needs were evaluated, and capacity provided in the unit facilities for the demands of all the arable lands that could be feasibly served by the unit. This criterion assures a water supply sufficient for local demands before any water would be exported. An incremental analysis was also made to test the justification of the more scattered or outlying lands.

Flood control. Flood control criteria were provided by the Corps of Engineers. The recommended flood control storage space and release requirements were included in the plan of development.

Municipal and industrial. Local municipal and industrial water needs were investigated. However, results of the investigation revealed existing nearby community supplies now appear adequate, with the ground-water potential adequate for foreseeable future needs. Provision could be made to supply municipal and industrial water from the unit to the local area should the requirement arise.

Fish and wildlife. Fish and wildlife evaluations were based on recommendations by the Bureau of Sport Fisheries and Wildlife.

Initial planning considered releases from Paskenta Reservoir to enhance anadromous fishery in Thomes Creek. These releases were not included in the plan as presented because of poor water temperature, sediment and spawning gravel conditions, and questions of adequate stream temperatures. Enhancement of anadromous fishery might be feasible when import supplies become available and should be restudied at that time. The unit was evaluated on the basis of warm-water fishery to be established in the reservoirs. Wildlife mitigation land has also been included to compensate for loss of lands in the reservoir areas, the Paskenta site being one of the best winter deer-range areas in the State.

Recreation. Recreation was considered and the recommendations of the Bureau of Outdoor Recreation incorporated in the plan of development. Facilities and cost of recreation lands have been included in unit costs.

Water quality. No special water quality features have been incorporated in the plan. The possible need for water quality measures has been evaluated by the Federal Water Pollution Control Administration, now the Environmental Protection Agency.

Power. The power potential of the unit was considered. Lack of firm yearly releases eliminated the possibility of installing a powerplant at either of the dams. Pumped storage potential was considered, but at the present time, power for peaking is not needed in the area.

If import supplies from North Coast streams become available, a powerplant might be feasible and provision has been made in the Newville Dam for it.

This Paskenta-Newville Unit, operating as an integral part of the Central Valley Project, would increase the flexibility of power operation by allowing an exchange between Newville Reservoir and Shasta or Trinity Reservoirs in meeting the Sacramento River mandatory releases. These mandatory releases, made through the Shasta or Trinity River Division powerplants on a water-demand pattern, could with this exchange be made more nearly as required for power generation.

Reservoir selection and sizing. Previous studies in the area by the Bureau of Reclamation and the State Department of Water Resources had determined the location and sites for the unit reservoirs. The location and the relationship of Paskenta damsite, Thomes Creek flows, and the adjacent Newville storage site have no local alternative. Paskenta Dam was sized to meet local irrigation demands along Thomes Creek and the adjacent area, to provide sediment storage, and to serve as a diversion structure to Newville. The indicated cost of incremental storage at Paskenta was approximately equal to that at the optimum-size Newville.

Studies were made over a range of sizes from 1 million to over 3 million acre-feet, including consideration of stage construction. Various methods of evaluating the benefits from incremental sizes

were examined to properly account for the extended filling period. The combination of increasing costs of crowding the limit of the topography of the Newville ridge and the reducing benefits from deferred values, recognizing filling periods, were found to point to an optimum size of close to 3 million acre-feet of storage at Newville, even with a considerable range in benefit values.

Newville Reservoir was sized to make maximum use of the local tributary inflow. Incremental benefits for unit yields were compared to the incremental cost of storage. Incremental benefits equalled incremental costs at about 3 million acre-feet, with appropriate discounting of benefits for a filling period of about 25 years.

Recreation and reservoir fishery benefits would maximize at reservoir sizes smaller than those selected for irrigation and flood control; therefore, the recreation and fishery purposes did not influence reservoir sizing.

Paskenta Reservoir was sized at 129,800 acre-feet and Newville at 2,986,700 acre-feet.

Canal and distribution system. Open lined canals and a pipe distribution system were selected for the local irrigation delivery system.

The location, length, and size of the facilities were determined along with the selection of lands for the service area. The service area consists of stringers of arable lands along streams in

parallel strips separated by stream channels and intervening class 6 land. Each stringer was treated as an increment and the incremental cost of serving it was calculated. Only those lands which could be economically served were included.

From Paskenta Dam, all lands would be served by gravity; from Newville Dam, the land would be served by gravity when the reservoir would be at or over half full. When the water surface in Newville Reservoir would drop below elevation 874 feet, a small pumping plant would lift water to the high points in the service area near Newville Dam.

Black Butte-Sacramento River Conveyance. The Black Butte-Sacramento River Conveyance would be used for conveying export water from Newville Dam to the Sacramento River. Water released from Newville Dam would flow down Stony Creek, through Black Butte Reservoir, and into this canal. The canal which would have a capacity of 2,500 c.f.s., and length of about 14 miles, would discharge into Rice Creek, which would be channelized for 3.9 miles to the Sacramento River.

The conveyance canal would be used only during dry periods when releases from the unit would be necessary to supplement Central Valley Project supplies. Releases up to 3,000 cubic feet per second from Newville would be required. At maximum release 500 cubic feet per second would flow down Stony Creek below Black Butte.

The canal was planned for conveyance in lieu of using Stony Creek to carry all export water, because of a series of unanswered questions regarding the technical and legal aspects of occasional summer-season high flows in the natural channel. High summer flows in Stony Creek may adversely affect adjacent farmland by creating a higher than normal ground-water table, with resulting loss of supply.

PART VI

ENVIRONMENT AND ECOLOGICAL ASPECTS

The environmental impact of the Paskenta-Newville Unit has been evaluated in compliance with the National Environmental Policy Act of 1969 (P.L. 91-190).

EVALUATION

The net effect of the Paskenta-Newville multiple-purpose project on the environmental and ecological aspects of the area should result in an overall enhancement or improvement to the environment and economy of the area. With the exception of a potential conflict with deer wintering range, the project dams, reservoirs, and canal and distribution system would generally enhance the fish and wildlife and recreational aspects of the area. This area has a direct need for this type of development to accommodate the anticipated or projected use of facilities as soon as they are available. The canal and distribution system to serve the local area water needs would influence the environmental and ecological aspects of the local area, by changing it from a dry-land operation to a fully irrigated economy.

Alternative plans considered during the study would have a greater adverse effect on the environment of the entire north coast area than the proposed plan of development.

The exportation of unit water to the Central Valley Project would not adversely affect the Sacramento River and would enhance the Delta pool operation by supplying future needed water to the

Central Valley Project area for irrigation, municipal and industrial, water quality, fish and wildlife, and recreational requirements.

Construction of the project facilities would be accomplished in such a manner that the damage or disturbance to the existing environmental conditions and ecological factors of the area would be minimal.

The environmental impact on the area due to construction of the project will require a detailed evaluation when a new feasibility study is justified, which could be around the turn of the century. New criteria, no doubt, would then be available for measuring environmental impact to an area resulting from construction of a project of this magnitude.

ASPECTS EVALUATED

Water Quality

The proposed project would have both beneficial and adverse environmental effects from the standpoint of water quality. In a long-term carry-over reservoir such as Newville Reservoir, the concentration of salts could reach a higher level than that of the inflowing water. The total dissolved solids content of Thomes Creek averaged 86 parts per million for 43 samples collected from 1959 to 1965. Studies indicate, however, that the quality of releases from Paskenta and Newville Reservoirs would be suitable for most beneficial uses. The major releases from Newville Reservoir would be made in critical dry years to firm up supplies

of the Central Valley Project. These releases would flow to the Sacramento-San Joaquin Delta for use in Central Valley Project service areas. The relatively low total dissolved solids content of the Newville Reservoir water (about 85-146 p.p.m.) could help to reduce the salinity of the waters in the Delta during dry years.

Paskenta and Newville Reservoirs could be expected to stratify thermally during the summer and fall months. Also, during this time of year, the dissolved oxygen content in the hypolimnion region of the reservoirs might be seriously depleted, due to biochemical oxygen demand in the bottom sediments and biological productivity in the reservoir. Reservoir releases from levels of very low dissolved oxygen could create downstream taste and odor problems and could be very detrimental to downstream fisheries. Multilevel outlets for both dams would insure satisfactory temperatures and dissolved oxygen for the downstream beneficial uses.

The sediment yield from Thomes Creek and North Fork Stony Creek drainage basins is very high. Water quality records from nearby reservoirs indicate that some of the sediment entering Paskenta and Newville Reservoirs would be slow to settle out. The reservoirs would likely remain turbid for several months following large inflows, especially at the lower depths. Releases made from near the bottom of the reservoirs could also cause mixing of bottom sediment with the water, further increasing the turbidity of releases. Since most of the releases from Newville

Reservoir would be made during critical dry periods, several months or years after the last high inflow, they would probably be low in turbidity if made from the upper levels of the reservoir.

There is a potential for algal growth problems in both Paskenta and Newville Reservoirs, particularly if sewage effluent from future recreational and subdivision developments were allowed to enter the drainage basin without proper treatment and control. The following preventive measures may aid in minimizing future algal growth problems. Proper clearing of the reservoir areas would prevent nutrients and decaying vegetation from entering the water. Any borrow areas utilized in the reservoir drainage areas above the maximum water surfaces should be graded and reforested, so that the amount of sediment runoff originating from them would be minimized. All subdivisions, recreational areas, and campsites in the reservoir drainage areas should have adequate sewage facilities of watertight construction to prevent nutrients and domestic sewage from entering the reservoir watersheds.

In general, the water releases from both reservoirs are expected to be satisfactory for all of the projected beneficial uses and would not be in violation of applicable water quality standards.

Streamflow Regimen

Streamflows would be regulated to have less fluctuation and flows would be greater than they normally are during the dry

summer months. Conversely, winter flows would be reduced and better regulated. The tributary streams to the Sacramento River presently have intermittent flows during the summer. Floodflows would be controlled as most all floodwater would be stored in the project reservoirs. Storing this water would improve flood conditions in the Sacramento River Basin.

Pollution

The operation of the project would not, to any extent, pollute the air, water, or soil and therefore, would not adversely affect the environment or ecology of this area. The use of toxic herbicides and pesticides in the project area must be controlled to protect the water, soil, fish and wildlife, and human beings in the area. Present regulations, if implemented, would give ample protection to these environmental elements of this agricultural area.

Fish and Wildlife

Fishing in the presently uncontrolled streams is very poor. Floodflows in the winter months and very low flows in the dry summer months do not sustain a fishery under present conditions. Storage of floodwater would provide a good warm-water reservoir fishery potential, expected to be of immediate use due to the absence of any competing facilities of this magnitude in the area. Stream fishing below the impoundments should improve as the streams would have a continuous year-round flow with project operation.

It was determined that enhancement of the anadromous fishery in Thomes Creek was not feasible because of poor water temperatures and spawning gravel conditions in the stream. Year-round flows with the project could change this aspect.

The development and operation of this project would not harm the present fishery environment; in fact, the present fishery potential of the area would be improved by the addition of the reservoir fishery function.

Wildlife mitigation was included in the project and was planned to compensate for the adverse effects to wildlife in the area. The California State Department of Fish and Game has recently indicated that the present mitigation proposal to provide winter range for the deer herd in the area is inadequate. The Paskenta Reservoir would inundate nearly 2,000 acres of extremely critical deer winter range. The reservoir area, as now estimated, conservatively supports a minimum of 1,100 deer during the critical winter months. The proposed mitigation plan would compensate for only a portion of the currently large estimate of deer use in this particular area. The estimate in the 1967 Fish and Wildlife report of number of deer wintering in the Paskenta Reservoir area was much smaller than the current estimate. If this apparent discrepancy is a normal fluctuation in the number of deer and the current estimate is valid, the present plan of development would adversely affect the wildlife aspect of the area. In the future feasibility studies, a

detailed study should be made of the deer use in the project area. A new mitigation proposal could then be planned and presented to support development of the project area.

Newville Reservoir would not adversely affect the wildlife habitat as it is not a critical winter deer range area. The area to be inundated by this reservoir is presently used for pasture of livestock. Small game and bird habitat could be improved by having a year-round water supply available for use by the wildlife in the adjacent areas.

Fish and wildlife conditions, except for deer habitat at the Paskenta site, should be improved by development of the proposed project.

Recreation

The proposed reservoirs of the Paskenta-Newville Unit would offer valuable new outlets to help meet the increasing demands for outdoor space, particularly water-oriented recreation areas. They would be open for year-round public use and be readily accessible from major thoroughfares. While most of the recreation use would occur from April through September, the proximity of population centers, coupled with relatively mild winters, should result in considerable recreation use throughout the year. The proposed reservoirs would offer a full complement of recreation activities including among others, boating, water skiing, swimming, camping, picnicking, hiking, and regional park-type activities. The proposed

reservoirs would provide an additional 15,000 acres of water surface during the recreation season in most years. These potential recreational activities would enhance the environmental and ecological aspects of the service area. Consideration should be given to waste control and the development of a quality use plan. Adjacent National Forest lands are presently available to support a major part of the proposed recreational development. The recreation potential of the project area was evaluated by the Bureau of Outdoor Recreation in 1966-1967.

Flood Control

A measurable amount of flood control protection would be provided by the Paskenta and Newville Reservoirs. The project would be effective in reducing floodflows primarily in the Thomes Creek flood plain and the Sacramento Valley area below the confluence of Thomes Creek with the Sacramento River. Controlling floods in this area would protect many acres of rich farmlands now growing field crops, orchards, truck crops, and provide protection to the urban communities and farm homes. This potential flood protection would maintain and enhance the environmental aspects of the area.

Land Inundation and Use

Approximately 19,000 acres of dryland pasture and some brush and timber areas would be inundated by the Newville and Paskenta Reservoirs. Other lands adjacent to these reservoirs would be

used for right-of-way and recreation activities. The use of these lands for project purposes would affect the environment of the area by taking them out of wildlife use.

Historical and Archeological Sites

Several historical and archeological sites in the potential reservoir areas should be studied and photographed, and the artifacts salvaged to document environmental and ecological conditions of past generations. Historical investigations and archeological surveys of all areas that would be affected by the project would be undertaken prior to any construction of project features. The National Park Service surveyed the project area and recommended $160,000 for salvage work in the area to be inundated.

Quality of Life

The quality of life would be greatly enhanced by development of this project. One major advantage would be the stabilization of the economy by providing new economic and social opportunities in the immediate area and in the entire Central Valley Project area.

The human environment would be enhanced for area residents by the change from dryland to irrigated agriculture.

Every precaution would be taken during construction of the project to protect and enhance the overall human environment of the area.

PART VII

ECONOMIC ANALYSIS

The economic analysis evaluates the economic justification of the Paskenta-Newville project, considering irrigation benefits as a measure of the benefits for the export water. The total export yield of 400,000 acre-feet would be integrated with the existing supplies of the Central Valley Project and as such the commingled supply would be used for a variety of water services. However, as the presently available Central Valley Project Delta water supplies are capable of meeting Central Valley Project requirements for some 20 years, the use for the Paskenta-Newville export water is unidentifiable at present. Hence a cost allocation and repayment analysis are not appropriate for this report.

The benefit-cost comparison is:

	Direct	Total
Annual benefits	$12,878,000	$26,690,000
Annual costs	$ 8,796,000	$ 8,796,000
Benefit-cost ratio	1.5:1.0	3.0:1.0

These benefits and costs are the annual equivalent values at 5-1/8 percent interest over a 100-year period.

Benefits

Tangible monetary benefits which accrue from the delivery of irrigation water, the development of recreation areas and fishery, and flood control provisions at the new reservoirs are:

Function	Benefits
Irrigation	$25,751,000
Direct	(11,939,000)
Indirect	(13,812,000)
Wildlife	4,000
Recreation	257,000
Fish and wildlife	68,000
Flood control	610,000
Total benefits	$26,690,000
Direct benefits	(12,878,000)

Project functions which benefit the local service area are explained in Part V.

Costs

Costs of developing the unit functions include the cost of construction of the storage, conveyance, and distribution facilities; interest during construction; and the cost of operation, maintenance, and replacement.

Investigation costs have been excluded from the economic justification, as the purpose of the benefit-cost comparison is to indicate whether future benefits would be sufficient to justify future costs.

Interest during construction was computed at 5-1/8 percent. Construction costs would be expended over a 7-year period for all but the ultimate recreation facilities. Those costs occurring in the seventh year and later have been discounted to year 1, the first year of project water service, to place them on a comparable time basis with the benefits. Costs for interest

during construction occurring after year 1 were also discounted for time of expenditure. The discounted net capital investment was then converted to an annual equivalent value at 5-1/8 percent for the 100-year period of analysis.

Annual equivalent operation, maintenance and replacement (OM&R) costs represent a uniform value for those expenditures for labor, materials, and supplies necessary to operate the project and make repairs throughout the economic life of the project.

Costs used for economic justification are:

Project cost (PF-2)	$149,769,000
Interest during construction	16,552,000
Total capital investment	$166,321,000
Less: Investigation costs	-300,000
Net capital investment	$166,021,000
Discounted net capital investment	163,382,000
Annual equivalent net capital investment	$ 8,431,000
Annual equivalent OM&R costs	365,000
Total annual equivalent costs	$ 8,796,000

INTEGRATION WITH CENTRAL VALLEY PROJECT

The Central Valley Project is envisioned as a Federally sponsored ever-enlarging entity. This concept created a nucleus for a self-liquidating project which permits water resource development in California consistent with Reclamation aims and objectives.

The Central Valley Project is composed of many interrelated units, each contributing to and benefitting from the overall project. These units can be readily identified physically, but because each incremental unit, when added, is dependent in part upon the base project, it cannot subsequently be separated operationally or financially.

The Central Valley Project operates financially under the "utility concept." Herein, all financial transactions are made from a common pool of revenues obtained from water service, power, and miscellaneous charges imposed on each unit. Such charges allow each unit to receive a perpetual service, with proprietorship of the unit's facilities remaining with the base project.

The Paskenta-Newville Unit, when authorized, would be proposed for financial and operational integration with the Central Valley Project.

Statistics by Years of Occurrence

The three following tables present the annual water deliveries (reservoir release basis) during the reservoir filling period, the anticipated annual benefits, and estimated annual costs. The estimates were based upon initial project operation in 1979; a major change in timing could affect these values and rates of buildup. Construction cost estimates are based upon January 1970 prices.

Table 11

Annual water deliveries during reservoir buildup period

Year				
Project	Fiscal	Local Service	Delta Pool	Total Yield
		(acre-feet) [a]		
1	1979	14,332		14,332
2	1980	17,199	16,000	33,199
3	81	20,065	32,000	52,065
4	82	22,931	48,000	70,931
5	83	25,798	64,000	89,798
6	84	28,664	80,000	108,664
7	85	32,710	96,000	128,710
8	86	34,397	112,000	146,397
9	87	37,264	128,000	165,264
10	88	40,130	144,000	184,130
11	89	43,000[b]	160,000	203,000
12	1990		176,000	219,000
13	91		192,000	235,000
14	92		208,000	251,000
15	93		224,000	267,000
16	94		240,000	283,000
17	95		256,000	299,000
18	96		272,000	315,000
19	97		288,000	331,000
20	98		304,000	347,000
21	99		320,000	363,000
22	2000		336,000	379,000
23	01		352,000	395,000
24	02		368,000	411,000
25	03		384,000	427,000
26	04	43,000[b]	400,000	443,000

[a] Reservoir release quantities
[b] 36,450 farm delivery

Table 12

Annual Occurrence of Benefits ($1,000)

Year		Water	General	Reservoir	Fish & Wildlife			Flood
Project	Fiscal	Supply	Recreation	Fishery	Water-fowl	Up. Game	Wild-life	Control
1	1979	[a]	137,000		525	1,000	1,525	610,000
2	1980		140,000	2,550	536	1,020	1,556	
3	81		141,180	8,665	546	1,041	1,587	
4	82		142,230	14,780	557	1,061	1,618	
5	83		143,280	20,895	568	1,082	1,649	
6	84		144,330	27,010	579	1,102	1,681	
7	85		145,380	33,125	589	1,122	1,712	
8	86		146,430	39,240	600	1,143	1,743	
9	87		147,480	45,355	611	1,163	1,774	
10	88		148,530	51,470	621	1,184	1,805	
11	89		152,710	57,585	632	1,204	1,836	
12	1990		156,890	61,150	643	1,224	1,867	
13	91		161,070	64,716	654	1,245	1,898	
14	92		165,250	68,281	664	1,265	1,930	
15	93		169,430	71,846	675	1,286	1,961	
16	94		173,610	75,412	686	1,306	1,992	
17	95		177,790	78,977	696	1,327	2,023	
18	96		181,970	82,543	707	1,347	2,054	
19	97		186,150	86,108	718	1,367	2,085	
20	98		190,330	89,673	729	1,388	2,116	
21	99		204,547	93,239	739	1,408	2,147	
22	2000		218,764	96,804	750	1,429	2,179	
23	01		232,981	100,369	761	1,449	2,210	
24	02		247,198	103,935	771	1,469	2,241	
25	03		261,415	107,500	782	1,490	2,272	
26	04		275,632		793	1,510	2,303	
27	05		289,849		804	1,531	2,334	
28	06		304,066		814	1,551	2,365	
29	07		318,283		825	1,571	2,396	
30	08		332,500		836	1,592	2,428	
31	09		351,625		846	1,612	2,459	
32	2010		370,750		857	1,633	2,490	
33	11		389,875		868	1,653	2,521	
34	12		409,000		879	1,673	2,552	
35	13		428,125	107,500	889	1,694	2,583	
36	14		447,250	102,292	900	1,714	2,614	
37	15		466,375	97,083	911	1,735	2,645	610,000

[a] Water supply benefits per acre-foot (see water quantities):

	Direct	Total
Local service	$39.69	$ 56.89
Export (Delta service)	46.00	103.00

Table 12 (Continued)

		Annual Occurrence of Benefits ($1,000)					
38	16	485,500	91,875	921	1,755	2,677	610,000
39	17	504,625	86,667	932	1,776	2,708	
40	18	523,750	81,458	943	1,796	2,739	
41	19	538,125	76,250	954	1,816	2,770	
42	2020	552,500	71,042	964	1,837	2,801	
43	21	566,875	65,833	975	1,857	2,832	
44	22	581,250	60,625	986	1,878	2,863	
45	23	595,625	55,417	996	1,898	2,894	
46	24	610,000	50,208	1,007	1,918	2,926	
47	25	624,375	45,000	1,018	1,939	2,957	
48	26	638,750	47,500	1,029	1,959	2,988	
49	27	653,125	50,000	1,039	1,980	3,019	
50	28	667,500	52,500[b]	1,050	2,000	3,050	610,000

[b] Reaches $107,500 for period 2050-2078

Table 13

Annual Occurrence of Costs ($1,000)[a]

Year		Main Features		Recreation Lands & Facilities			Total
Project	Fiscal	Construction	OMR&E	Construction	O&M	Replac.	Costs
-7		300					300
-6	1973	600					600
-5	74	900					900
-4	75	13,940					13,940
-3	76	31,475					31,475
-2	77	50,044		250			50,294
-1	78	35,035		1,230			36,265
1	79	10,467	184.500	456	41.0	29.2	11,117.7
2	1980	1,495	223.251		43.		1,790.451
3	81		223.302		46.		252.548
4	82		223.285		48.		300.485
5	83		223.341		50.		302.541
6	84		223.329		52.		304.529
7	85		223.273		54.		306.473
8	86		223.289		56.		308.489
9	87		223.320		58.	29.2	310.520
10	88		223.359	465	60.	38.8	787.159
11	89		223.394		62.4		324.594
12	1990				64.8		326.994
13	91				67.2		329.394
14	92				69.6		331.794
15	93				72.0		334.194
16	94				74.4		336.594
17	95				76.8		338.994
18	96				79.2		341.394
19	97		223.394		81.6	38.8	343.794
20	98			787	84.0	54.7	1,149.094
21	99				88.8		366.894
22	2000				93.6		371.694
23	01				98.4		376.494
24	02				103.2		381.294
25	03				108.0		386.094
26	04				112.8		390.894
27	05				117.6		395.694
28	06				122.4		400.494
29	07				127.2	54.7	405.294
30	08			1,002	132.0	75.4	1,432.794
31	09				136.8		435.594
32	2010				141.6		440.394
33	11				146.4		445.194
34	12				151.2	75.4	449.994

Table 13 (continued)

Annual Occurrence of Costs ($1,000)

Year		Main Features		Recreation Lands & Facilities			Total
Project	Fiscal	Construction	OMR&E	Construction	O&M	Replac.	Costs
35	13				156.0	75.4	454.794
36	14				160.8		459.594
37	15				165.6		464.394
38	16				170.4		469.194
39	17				175.2	75.4	473.994
40	18			644	180.0	88.6	1,135.994
41	19				183.8		495.794
42	2020				187.6		499.594
43	21				191.4		503.394
44	22		223.394		195.2		507.194
45	23				199.0		510.994
46	24				202.8		514.794
47	25				206.6		518.594
48	26				210.4		522.394
49	27				214.2	88.6	526.194
50	2028			679	218.0	102.8	1,223.194
Total Const.		144,256.0		5,513.0			(Const.) 149,769.0

[a] Construction costs based on January 1970 prices. Estimates are for construction approximately in fiscal years shown; a major shift in time might affect the estimates.

PART VIII

CONCLUSIONS

The Paskenta-Newville Unit is a justifiable water resource development. Benefits would be derived from its water supply, water quality, fish and wildlife, flood control, and recreation functions. The unit has a benefit-cost ratio of 3.0 to 1.0. for total benefits, based upon January 1970 costs.

Present analyses of Delta water demands and existing supplies indicate that, as a water supply addition to the Central Valley Project, the unit is not needed until the late 1990's. Interest in irrigation within the local service area also appears to be long range.

The fish and wildlife and recreation measures of the unit have only a minor impact on Northern California demands for these functions. On the basis of recent information which could not be incorporated into the studies for this report, wildlife mitigation measures for the deer herd which winters in the Paskenta Reservoir area have been questioned by the State Department of Fish and Game.

Flood control, both on Thomes Creek and the Sacramento River, is the most urgently needed project function. Thomes Creek is one of several uncontrolled tributaries that enter the Sacramento River below Shasta Dam and contribute to the flood hazard in the Sacramento Valley.

Conclusions

It appears that further study and development of plans for the Paskenta-Newville Unit should be deferred until a more significant need for additional water supplies in the Delta can be demonstrated. At such time this study could be reactivated and all functions of the development restudied in detail. However, it is recognized that in view of the long filling period involved for Newville Reservoir, authorization and start of construction of project facilities should be anticipated well in advance of actual need.

APPENDED MATERIAL

Agreement on Feasibility Level Planning, California
State-Federal Interagency Group

Reports of the:

Corps of Engineers
Bureau of Land Management
Public Health Service
Fish and Wildlife Service
Bureau of Outdoor Recreation
Federal Water Pollution Control Administration

PASKENTA–NEWVILLE, RANCHERIA

AND

COTTONWOOD CREEK PROJECTS

Agreement on Feasibility Level Planning

Agreement by the

California State-Federal Interagency Group

JOINT U.S.–CALIFORNIA

WATER DEVELOPMENT PLANNING

AGREEMENT ON FEASIBILITY LEVEL PLANNING OF THE PASKENTA-NEWVILLE, RANCHERIA AND COTTONWOOD CREEK PROJECTS

CALIFORNIA STATE-FEDERAL INTERAGENCY GROUP

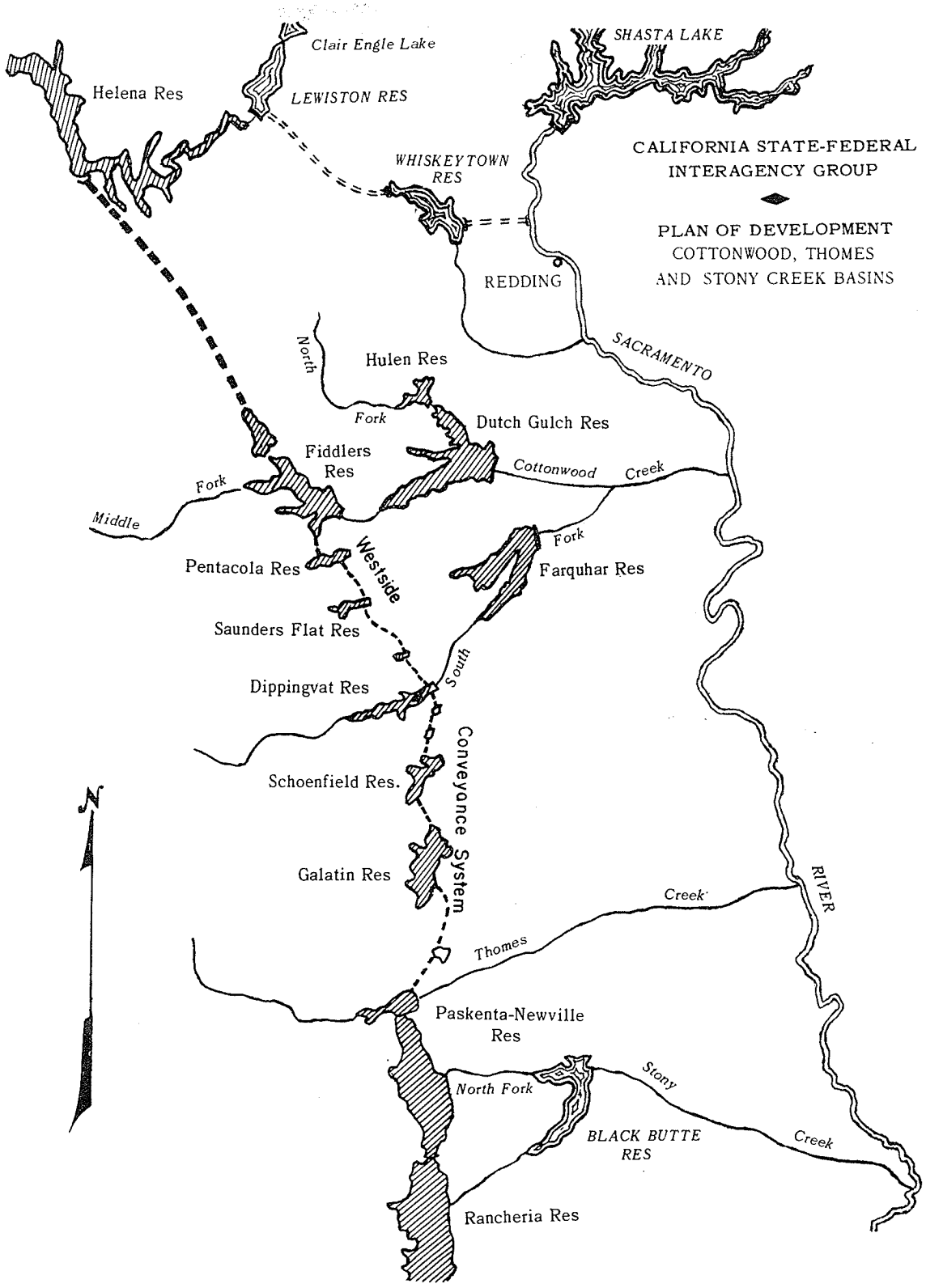
United States
Department of the Army
CORPS OF ENGINEERS

United States
Department of the Interior
BUREAU OF RECLAMATION

United States
Department of Agriculture
SOIL CONSERVATION SERVICE

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

September 1966


Clair Engle Lake
SHASTA LAKE
Helena Res
LEWISTON RES
WHISKEYTOWN RES
CALIFORNIA STATE-FEDERAL INTERAGENCY GROUP
PLAN OF DEVELOPMENT
COTTONWOOD, THOMES AND STONY CREEK BASINS
REDDING
SACRAMENTO
North Fork
Hulen Res
Dutch Gulch Res
Fiddlers Res
Cottonwood Creek
Middle Fork
Pentacola Res
Westside
Fork
Farquhar Res
Saunders Flat Res
South
Dippingvat Res
Conveyance System
Schoenfield Res.
Galatin Res
Creek
RIVER
Thomes
Paskenta-Newville Res
North Fork
Stony
Creek
BLACK BUTTE RES
Rancheria Res

First Extension of Joint Planning Agreement for Development of Water Resources of the Eel and Mad River Basins

AGREEMENT ON FEASIBILITY LEVEL PLANNING OF THE PASKENTA-NEWVILLE, RANCHERIA AND COTTONWOOD CREEK PROJECTS

California State-Federal Interagency Group
September 1966

The basic agreement establishing a joint program for development of the water resources of the Eel and Mad River basins, entered into on June 14, 1966, was extended by four agencies comprising the California State-Federal Interagency Group on September 1 to include division of responsibility for feasibility level planning of the Paskenta-Newville, Rancheria and Cottonwood Creek projects on the west side of the Sacramento Valley.

This extension of the basic agreement is based on the understanding that all four agencies will participate in the final formulation of each project included in the extension, with the objective of optimizing development of local resources and assuring that the projects formulated are in consonance with plans for diversion and storage of waters originating in the North Coastal area of California and provide the best sequence of construction to meet statewide needs. Further, it is understood that the State does not waive its rights to proceed with authorization and construction of the Paskenta-Newville or Cottonwood Creek projects in the event that federal authorizations are delayed or terms relating to the sharing of yield and storage capacity are not satisfactory to the State.

The Bureau of Reclamation is assigned primary responsibility for the completion of feasibility level planning and the seeking of federal authorization for the Paskenta-Newville Project on Thomes and North Fork Stony creeks, such project to be planned as a joint state-federal project with yield and storage capacity to be shared between the State Water Project and the Federal Central Valley Project.

The Corps of Engineers is assigned primary responsibility for developing feasibility level plans and seeking federal authorization for the Dutch Gulch and Farquhar projects and for determining the flood control potential of other possible projects in the Cottonwood Creek Basin. The Department of Water Resources and the Bureau of Reclamation will assist in defining the potential market for water conserved and power developed by future projects in the basin and in evaluating the conservation benefits. The State Water Project and the Central Valley Project will be considered as potential contractors for the water conserved.

The Department of Water Resources will reevaluate plans for development of the Upper Sacramento tributaries called for by Assembly Concurrent Resolution 18 and formulate a basin-wide master plan, making full use of information developed by the Corps for the Cottonwood Creek Basin. The Department of Water Resources is assigned primary responsibility for feasibility level planning of the Rancheria compartment of the Glenn Reservoir Complex, such development to be planned as a joint state-federal project in the same manner as described for the Paskenta-Newville compartment.

The Soil Conservation Service is assigned primary responsibility for watershed management planning in connection with the Paskenta-Newville, Rancheria and Cottonwood Creek projects. It is understood that the preparation of a watershed management plan is contingent upon authorization and funding of a USDA study of an intensity compatible with the needs of the lands tributary to the structures.

WILLIAM E. WARNE, *Chairman*
Director
Department of Water Resources
State of California

BRIG. GEN. ELLIS E. WILHOYT, JR.
Division Engineer
Corps of Engineers
U. S. Department of the Army

ROBERT J. PAFFORD, JR.
Regional Director
Region 2
Bureau of Reclamation
U. S. Department of the Interior

THOMAS P. HELSETH
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture

CORPS OF ENGINEERS

BENEFITS FROM FLOOD CONTROL

Paskenta and Newville Reservoirs

Letter from the District Engineer

of the

Sacramento District

Corps of Engineers

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
650 CAPITOL MALL
SACRAMENTO, CALIFORNIA 95814

IN REPLY REFER TO
SPKGP

1 March 1966

Mr. R. J. Pafford, Jr.
Regional Director, Region 2
Bureau of Reclamation
P. O. Box 2511
Sacramento, California 95811

Dear Mr. Pafford:

Reference is made to your letter of 12 April 1965 regarding your studies of Paskenta and Newville Reservoirs and requesting flood control criteria and evaluation of flood control benefits. The flood control studies are nearing completion, and the average annual flood control benefits are tabulated below.

The following flood control benefits are based on provision of 80,000 acre-feet of flood control space in Paskenta or Newville Reservoirs with flood control releases to be made into Thomes Creek, and flows in Thomes Creek limited to 5,000 c.f.s. This is the criteria furnished you informally in September 1965. Floodflows in excess of the established flood control space would be returned to Thomes Creek.

Stream	Average Annual Flood Control Benefits
Thomes Creek	$460,000
Sacramento River below Thomes Creek	90,000
Butte Basin	60,000
TOTAL	$610,000

Although based on a preliminary flood control diagram, the above data are considered satisfactory for feasibility studies.

The additional information requested by your letter referenced above will be furnished upon completion of our studies. In this connection, we would appreciate being advised as to the approximate date we can expect

SPKGP 1 March 1966
Mr. R. J. Pafford, Jr.

to receive the data regarding irrigation yields and benefits requested in our letter dated 27 April 1965, expanded to cover reservoir capacities up to 3,100,000 acre-feet.

Sincerely yours,

ROBERT E. MATHE
Colonel, CE
District Engineer

BUREAU OF LAND MANAGEMENT

IMPACT REPORT

Report by the State Director

Bureau of Land Management

Department of the Interior

U. S. Department of the Interior

BUREAU OF LAND MANAGEMENT

IMPACT REPORT

Paskenta-Newville Project

June 1967

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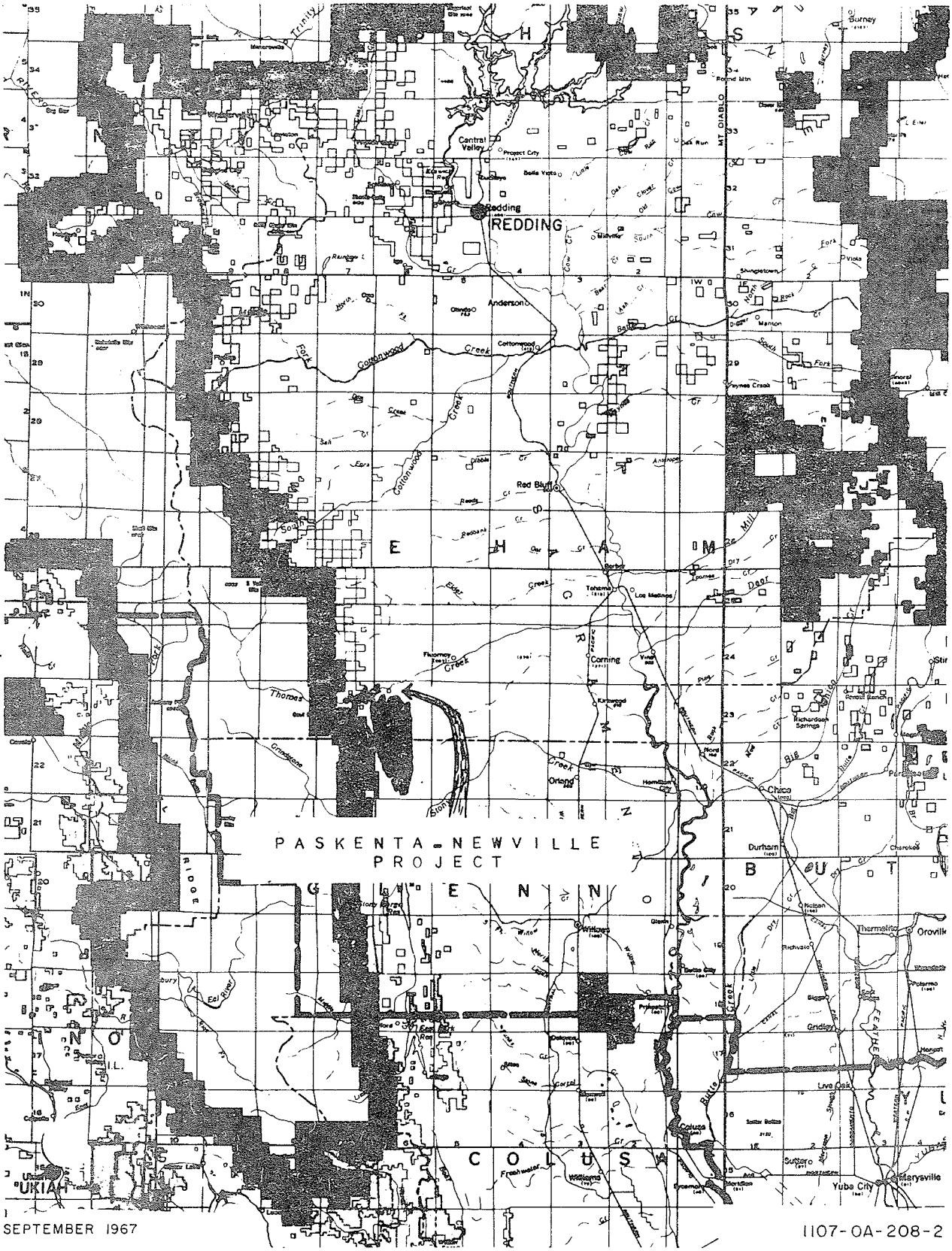


SEPTEMBER 1967

1107-0A-208-2

Impact Report on the Bureau of Reclamation

Proposed Paskenta-Newville Project

I. Introduction

A. Project Description

The proposed Paskenta-Newville multi-purpose water project has not been authorized at this time. However, the project is now being studied by the Bureau of Reclamation and the California Department of Water Resources.

The proposed Paskenta-Newville Project is located 25 miles west of Corning and Interstate Highway 5 in western Tehama and Glenn Counties. The project can be reached by paved Corning County road. Based on data collected at Black Butte Reservoir (10 miles east of Newville), 80% of the recreational visits to Paskenta-Newville Reservoirs will come from an area within 40 miles of the project. Good access is available to other California residents. The proportion of visits from the large population centers should increase.

This report will discuss the impact on Bureau of Land Management lands and resources should the Paskenta-Newville Project be constructed. The Bureau of Land Management is responsible for the management of several parcels of land within the project boundary. Additional BLM lands lie adjacent to or near the project boundary. The area to be flooded by the two reservoirs is primarily private land. There are 1,513 BLM acres within the project boundary and only 37 of those acres will be inundated.

The climate is characterized by long, dry summers and moderately wet winters. Annual precipitation averages 23 inches with 90% falling from October through April. Temperatures range from very warm in summer to cool in winter.

Cattle ranching and working at the sawmill in Paskenta are the main sources of income for the area. The sawmill at Paskenta is supported by timber from Mendocino National Forest. The chief use of lands within the project boundary is grazing. There are also some grain crops and family orchards.

Paskenta Reservoir would cover 1,900 acres when full. Water for local irrigation would be supplied by Paskenta Reservoir. Surplus waters would be diverted to contiguous Newville Reservoir. When filled, Newville Reservoir would have a surface area of 16,600 acres. Water releases from Newville Reservoir would be used to augment Sacramento River flows in dry years.

B. Summary of Effects on Bureau of Land Management Programs

Approximately 37 acres of BLM grazing lands will be inundated. An additional 600 acres of BLM grazing lands will be needed to preserve natural and scenic values and to provide room for recreational development. Approximately 876 acres of BLM watershed and open space lands will also be required to preserve the natural and scenic values of the area. There has been no request for withdrawal of the lands.

The project will further fragment BLM lands in northwestern Glenn County. Range improvements will be lost in the Paskenta area. Protection of BLM lands will be more difficult due to increased traffic and use by recreationists.

II. Effects of Proposed Project on Bureau of Land Management Lands, Resources and Programs

The map attached at the end of this report shows the location of BLM lands in relation to the proposed project.

A. Lands

The BLM lands in the Paskenta Reservoir area are in a Type I block within a Type II planning unit (0336). This means the lands are to be classified for retention in Federal ownership to meet future public needs. The BLM lands in the Newville Reservoir area are in a Type II (0336) planning unit and likely to be retained in Federal ownership to satisfy the needs of the Paskenta-Newville project. MVA classification is scheduled for completion during the third quarter, F.Y. 1968. The following lands will be directly affected by the project:

Paskenta Reservoir Area

T. 23 N., R. 7 W., M.D.M.	Acres BLM Lands Within Project Boundary	Acres Recreation Lands	Acres Inundated
Sec, 2, Lots 3,4, $S\frac{1}{2}NW\frac{1}{4}$, $S\frac{1}{2}$	480.01	400.01	7
Sec. 10, $E\frac{1}{2}NW\frac{1}{4}$	80.00	80.00	
Sec. 12, Lot 3	36.84		30
Sec. 14, $SE\frac{1}{4}SW\frac{1}{4}$	40.00	40.00	
Total	636.85	520.01	37

Newville Reservoir Area

T. 22 N., R. 6 W., M.D.M.	Acres BLM Lands Within Project Boundary	Acres Recreation Lands	Acres Inundated
Sec. 19, Lots 1, 2, 3, 4, E½W½	319.16	319.16	0
Sec. 30, Lots 1, 2, 3, 4, W½E½, E½W½, SW¼SE¼	437.52	437.52	0
Sec. 31, Lot 1, NW¼NE¼, NE¼NW¼	119.14	119.14	0
Total	875.82	875.82	0
Total Both Reservoirs	1,512.67	1,395.83	37

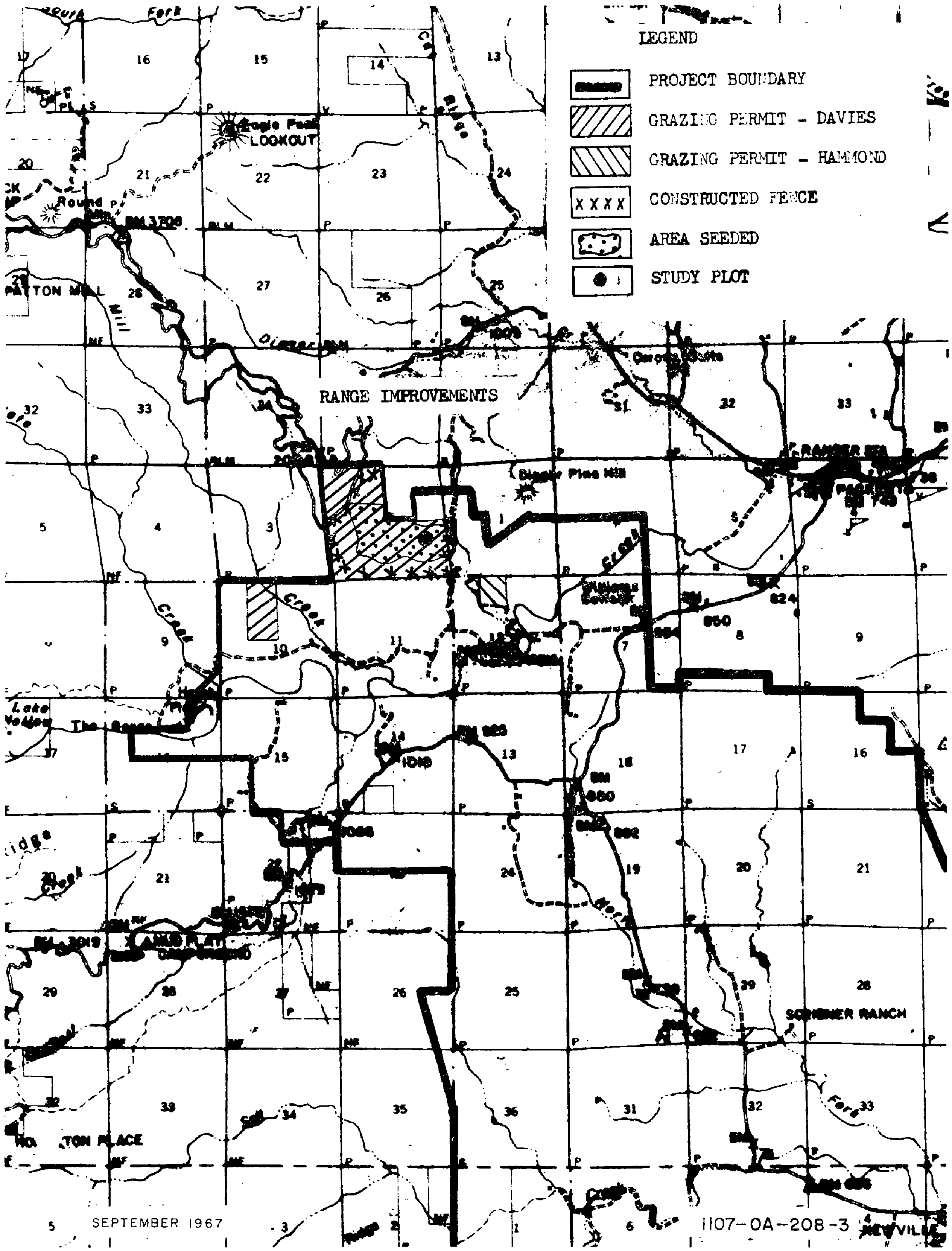
Request for withdrawal of BLM lands for the Paskenta-Newville Project has not been received. Some of the affected BLM lands are withdrawn for other purposes. They are as follows:

PLO 3890, 11/29/65, Power Site Classification
T. 23 N., R. 7 W., M.D.M.
Section 2, W½SE¼

Yolla Bolly National Cooperative Land & Wildlife Management Area
T. 23 N., R. 7 W., M.D.M.
Section 2, Lots 3, 4, S½NW¼, S½

The project will embrace all BLM lands between the reservoirs and Mendocino National Forest. Fragmentation of lands will be most serious in the area south of Newville Reservoir where 493 acres of BLM lands will remain in small, isolated parcels. The fragmented lands are chiefly valuable for wildlife habitat, watershed, and access to other Federal lands. The California State Water Plan shows a possible storage reservoir south of Newville which would directly affect many of the BLM lands fragmented by Newville Reservoir.

BLM lands north of the Paskenta-Newville Project will be affected to


LEGEND
PROJECT BOUNDARY
GRAZING PERMIT - DAVIES
GRAZING PERMIT - HAMMOND
CONSTRUCTED FENCE
AREA SEEDED
STUDY PLOT
RANGE IMPROVEMENTS
LOOKOUT
Digger Pine Hill
SCHNEIDER RANCH
SEPTEMBER 1967
1107-0A-208-3

the extent that visitors to the area will explore and use the lands along access roads leading to the National Forest. The presence of these additional visitors will intensify protection and management problems. The California Division of Forestry provides the fire protection for BLM lands in this area.

Major access roads should be replaced if inundated. No access routes leading to BLM lands will be lost if this is done. The BLM has constructed no roads in the area.

The project boundary provides for an adequate buffer zone around the reservoirs. Possible brush manipulation on peripheral lands north of the project boundary to mitigate critical deer winter range loss would require careful planning to prevent unsightly scars.

B. Range

Much of the BLM land north of the proposed Paskenta Reservoir is used for grazing purposes. Grazing permits have been issued to the following ranchers in the area:

Permit	AUM's Permitted	AUM's Lost
Hammond	7	7
Davies	151	151
	158	158

The project boundary will eliminate all the above grazing use. Present rental rate is $ .33 per AUM. Annual loss of 158 AUM's with an annual rental of $52.14 can be expected.

A seeding project on 110 acres was completed in 1961 at a cost of $11,145 ($1,146 BLM and $9,999 contributed). Life expectancy of the seeding is 20 years. Assuming the project will be constructed in 1975, there will be six years depreciation unused.

Paskenta fence project was completed in 1965 at a cost of $3,092 ($1,142 BLM and $1,950 contributed). The fence will not be needed for the grazing permits after 1975. Salvage estimates for the fence are $200.

A study plot was constructed in 1965 to determine the effects of grazing on the seeding area over long periods of time. When the cattle are removed, there will be no need for the study plot. Total cost of the plot was $638 ($255 BLM and $383 California Department of Fish and Game).

C. Recreation

The Bureau of Land Management has two inventoried recreation sites within the proposed Paskenta-Newville Project boundary. These campgrounds are not scheduled for construction before the Paskenta-Newville Project assumed construction date of 1975.

The Bureau of Outdoor Recreation's review draft on the recreational aspects of the Paskenta-Newville Project indicates a need for approximately 3,885 acres of land to preserve natural and scenic values and to provide room for development. The BLM now administers 1,396 acres, or about 1/3 of the total area needed.

Data collected at Black Butte Reservoir (10 miles east of Newville) indicates that 84% of the recreation use originates in an area having a 40 mile radius. About 8% of the visitor days came from more than 100 miles. This ratio may change when the larger complex of water-based recreation is available and becomes known.

There were 41,000 people living within 40 miles of the Paskenta-Newville Project in 1965. The population of Tehama and Glenn Counties increased by nearly 20% from 1958 to 1965 according to California Department of Finance figures. This rate of growth is expected to continue through 1980. At the same time the participation rate of individuals will increase causing greater demand.

The Bureau of Outdoor Recreation estimates an initial recreation use at the Paskenta-Newville Project of 137,000 visitor days. The use is to increase to 667,500 visitor days in 50 years.

Initial recreation improvements are planned for camping, picnicking, boat launching, swimming, and sanitary facilities. Parking areas and major roads will also be developed. The cost estimate for the first ten years, including land acquisition, is $1,723,000 chargeable to recreation. Initial construction will include all facilities needed through the first ten years. These costs will be met out of project funds. Other costs not met out of project funds are the operation, maintenance, and replacement costs. Operation and maintenance costs are estimated at $41,000 in year one. An incremental increase of $2,000 per year is expected except in year three when an increase of

$3,000 is anticipated. Annual replacement costs are estimated at $35,700.

D. Access

The Paskenta-Newville Project will not cause any loss of access to BLM lands outside the proposed project boundary. Relocation of existing roads plus addition of recreation roads as proposed in the review draft on the recreational aspects of the project by the Bureau of Recreation should provide adequate access.

E. Fish and Wildlife

The Bureau of Sport Fisheries and Wildlife has completed a detailed report on the effects of the Paskenta-Newville Project on fish and wildlife resources. The Bureau of Land Management concurs with the conclusions found in that report. BLM lands outside the proposed project boundary, although steep and scattered, do contribute to the winter range of black-tailed deer. Increased hunting effort on these lands may be expected in the future, especially if better access is provided.

F. Resource Protection

Recreational developments will attract large numbers of people to the project area. Some of these people will visit the public lands outside the immediate reservoir area causing additional fire risk. This project could cause the re-evaluation of the state BLM fire contract resulting in higher protection fees paid by BLM to the state of California for fire protection of the public lands. The BLM contracts all its fire protection in the area to the California Department of Forestry. Their station at Paskenta provides proximity protection for the project area.

G. Forestry

The lands in and near the Paskenta-Newville Project area do not support commercial timber. The hardwoods and digger pine found in that vicinity are more valuable for aesthetic purposes than for firewood or other commercial uses.

H. Natural Beauty

Relocation of roads and pole lines should be accomplished in a manner to preserve the natural beauty of the area. Power to the developed areas should be placed underground. Scenic areas such as Williams Butte and the peninsulas extending into the reservoirs should receive special consideration to protect their natural attributes. Very little residual BLM land remains within sight distance of the proposed reservoirs. There are no present projects or plans involving the residual lands lying within sight distance of the proposed reservoirs although some potential exists for conversion of brush to grass. Such conversion would not severely disturb the natural beauty as seen from the proposed reservoirs.

I. Minerals

The U.S. Forest Service report on the Paskenta-Newville Project suggests the presence of valid mines west of the project boundary in the Red Mountain area. Chrome ore has been mined from Red Mountain in the past, but since World War II there has been very little mining activity.

Exploratory shafts and surface disruptions on BLM lands inside the

project boundary are indications that mining claims exist on the BLM lands. Four areas show mining activity which would indicate at least four mining claims. Validity determinations done on a reimbursable basis would cost an estimated $500 for each mining claim. More than four mining claims may exist on BLM lands in the area.

III. Impact of Project on BLM Program

A. Reimbursable Cost Estimates and Resource Replacement Costs - Chargable to the Project.

1. Mining Claim Validity Determination:
4 Claims @ $500 = $2,000

2. Salvage Costs of Livestock Control Fence (fence will not be needed after completion of the project). 200

3. Loss of 6 years use of Range Reseeding Project (20 year life - cost $11,145; BLM cost $1,146, $9,999 contributed by range user - James Earl Davies, Flournoy, California)
Amount reimbursable to Davies: 3,000
Amount reimbursable to BLM : 345

Total $5,543

B. Irreplaceable Resources

1. Loss of 158 Animal Unit Month's of forage per year @ $.33 = $54. per year

Opportunity Cost @ 3 1/8% (50 years) $1,314

Total Opportunity Cost 1,314

IV. General Provisions and Recommendations

1. Because of the limited amount of public domain lands within the Paskenta-Newville Reservoir Project, it would not seem logical for the Bureau of Land Management to be responsible for recreation management at the project.

However, if it is decided that a federal agency should be responsible for recreation at the project, and if that agency were unable to assume the management responsibilities, BLM would reconsider managing the recreation and other land uses.

2. Public lands within the project boundary should be withdrawn as soon as possible.

3. All land within the project boundary not needed for project operation should be managed by the agency responsible for recreation.

4. The constructing agency should give due considerations to the BOR recommendations for preserving the natural attributes of the area.

Form 173
(January 1960)

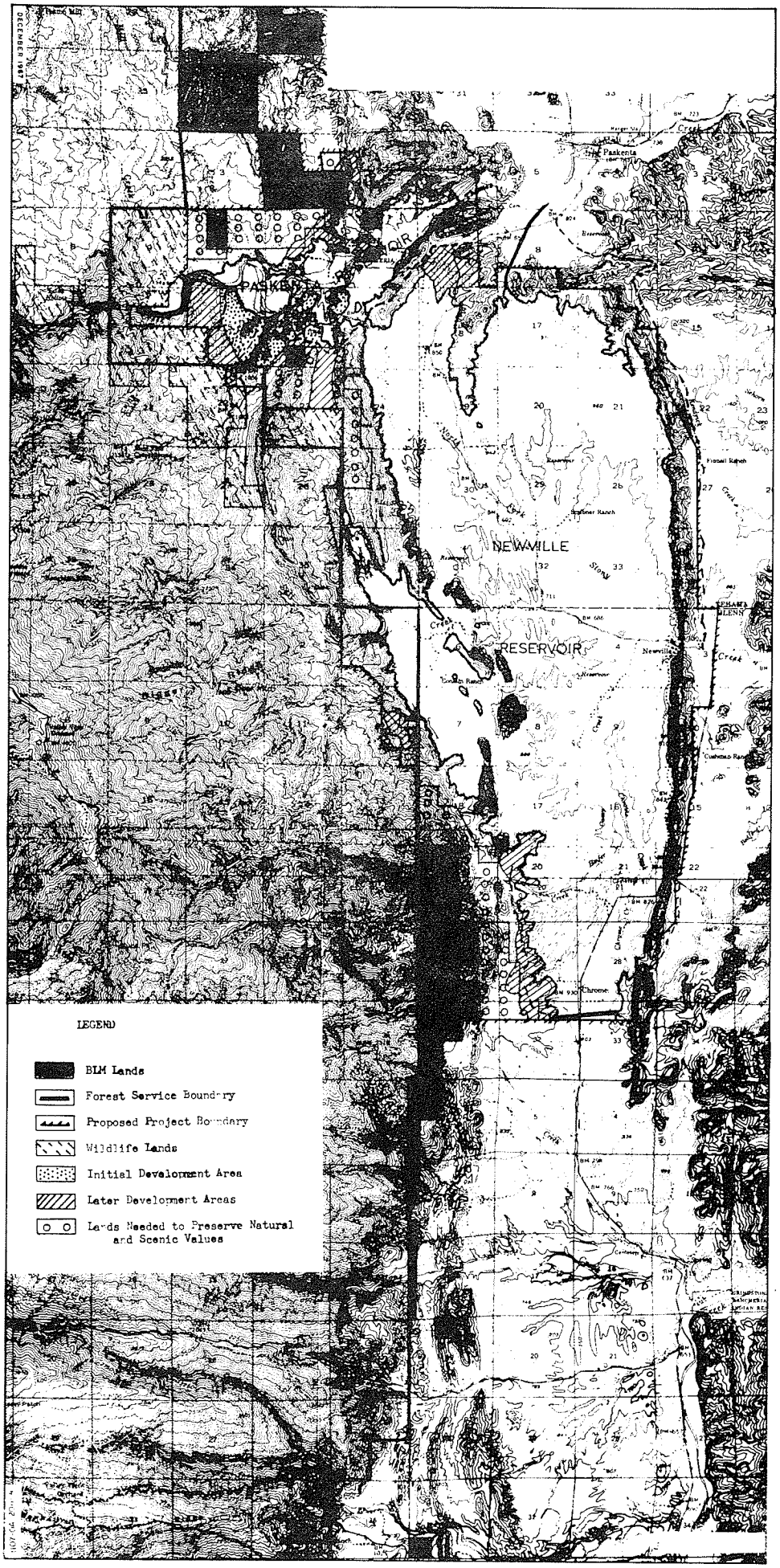
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

TABULATION OF LANDS REQUESTED FOR PROJECT

LEGAL DESCRIPTION	TYPE OF LAND				REQUIREMENT FOR LAND					RECOMMENDED ACTION *	
	P.D.	ACQUIRED	L.U.	O&C	RESERVOIR, DISTRIBUTION SYSTEM, ETC.	IRRIGABLE LANDS	LANDS FOR RECREATIONAL USE	OTHER USES (WILDLIFE, ETC.)		APPROVAL OR DISAPPROVAL	AUTHORITY FOR WITHDRAWAL TO BE USED, IF APPROVED
	(ACRES)				(ACRES)			(ACRES)	USE		
T 22 N, R 6 W, M.D.M.										All Approval	Not Requested
Sec. 19-Lots 1, 2,3,4, E½W½	319.16						319.16				
Sec. 30 - Lots 1, 2,3,4 W½NE¼ E½W½, W½SE¼	437.52						437.52				
Sec. 31 - Lots 1, 2 NW¼NE¼ E½NW¼	119.14						119.14				
T 23 N, R 7 W											
Sec. 2-Lots 3,4, S½ NW¼, S½	480.01				80.00		400.01				
Sec. 10 E½NW¼	80.00						80.00				
Sec. 12 - Lot 3	36.84				36.84		- -				
Sec. 14 - SE¼SW¼	40.00						40.00				
Total	1512.67				116.84		1395.83				

* *Complete for withdrawal report only*

GPO 855-543


DECEMBER 1987
PASKENTA
NEWVILLE
RESERVOIR
Paskenta
Newville
Chrome
LEGEND
BLM Lands
Forest Service Boundary
Proposed Project Boundary
Wildlife Lands
Initial Development Area
Later Development Areas
Lands Needed to Preserve Natural and Scenic Values

PUBLIC HEALTH SERVICE

PUBLIC HEALTH ASPECTS OF THE PASKENTA – NEWVILLE UNIT

Letter from the

Regional Program Director

Public Health Service

U. S. Department of Health, Education and Welfare

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGIONAL OFFICE

PUBLIC HEALTH SERVICE
50 Fulton Street
San Francisco, California 94102

April 28, 1967

Mr. C. H. Kadie
Acting Regional Director
Bureau of Reclamation, Region 2
U. S. Department of the Interior
P. O. Box 15011
Sacramento, California 95813

Dear Mr. Kadie:

In accordance with our previous correspondence, there is transmitted herewith Public Health Service comments on your Paskenta-Newville Unit, Lower Trinity Division, North Coast Project, California.

As indicated to you in my letter of December 28, 1966, the information on this project which you provided has been reviewed by this office and, at our request, by the following:

Disease Ecology Section, National Communicable Disease Center, U. S. Public Health Service
Bureau of Sanitary Engineering, California Department of Public Health
Bureau of Vector Control, California Department of Public Health

The brief background information you provided indicates that the major project features consist of Paskenta and Newville Dams, located about 22 miles west of Corning, California, on Thomes Creek and North Fork Stony Creek, respectively. The Paskenta-Newville Unit would be a multipurpose project serving the functions of water service, flood control, recreation, and fish and wildlife enhancement. Other facilities would include conveyance and distribution systems for irrigation of lands in the service area.

These comments on public health aspects deal with the sanitation measures related to recreational facilities and potential vector problems. They include comments and recommendations of all the reviewers mentioned above.

Recreation

Since details of your plans for recreational activities are not known, these general observations only can be offered at this time. Drinking

water supplies, facilities for sewage and refuse disposal, and possibly bath houses, will be necessary if recreational developments of any magnitude are provided. Such facilities should meet the suggested requirements of the Pacific Southwest Inter-Agency Committee for Water Works and Sewage Works and the Administrative Guide Covering Health Problems in Recreational Areas and should be satisfactory to the California Department of Public Health. Copies of the PSIAC manuals are enclosed for your use in the event they are not already available to you.

Vectors

A field review of the project area revealed that the two proposed reservoir sites are in natural basins with fairly rugged hills delimiting the areas. Trees and shrubs are restricted to creek bottoms and the crests of the hills. The hills throughout the zone of water fluctuation are covered by native grasses.

Clearing of trees and shrubs should be relatively easy because of their restricted occurrences. Although the zone of fluctuation is mostly free from large vegetation that would need to be cleared, it does have a large area of rolling land with a potential for areas in which water could be trapped as the level recedes. Since the project is planned as a re-regulatory reservoir, these areas could be repetitive sources of mosquitoes unless they are made to be self-draining.

In order to minimize public health hazards, all feasible efforts should be made to avoid creating habitats which increase populations of mosquitoes or other arthropods and rodents of public health importance or which will result in increased exposure of humans to vectors of both aquatic and terrestrial origin. It is recommended that:

1. Where applicable, all of the principles and practices for prevention and elimination of mosquito sources associated with irrigation outlined in Attachment A be adhered to in the design, construction, and operation of the proposed project.

2. Where applicable, the principles and practices for prevention and control of vector problems associated with reservoirs outlined in Attachment B be adhered to in construction and operation of the proposed project.

3. Since the Water Resources Consultant, Bureau of Vector Control, California State Department of Public Health, is thoroughly familiar with the mosquitoes and other vectors of public health significance in the project area, the types of habitats productive of these vectors, and the measures for minimizing

their production, the Bureau of Reclamation officials consult with the Water Resources Consultant relative to specific problem areas and applicable vector control measures to be incorporated into the plan of project development.

Thank you for the opportunity to comment on this project.

Sincerely,

F. E. DeMartini
Regional Program Director
Water Supply & Sea Resources Program

Enclosures (5)
Attachments A and B and
3 PSIAC manuals.

cc:
H. B. Foster, Chief, Bu. of Sanitary Engineering,
Calif. State Dept. of Public Health (Attn: Mr. Ongerth)
M. C. Kramer, Sr. Vector Control Specialist, Calif.
State Dept. of Public Health, Sacramento
F. C. Harmston, Disease Ecology Section, NCDC, PHS

FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE RESOURCES OF THE PASKENTA–NEWVILLE UNIT

Report of the Regional Director

Bureau of Sport Fisheries and Wildlife

Fish and Wildlife Service

Department of the Interior

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

ADDRESS ONLY THE
REGIONAL DIRECTOR

730 N. E. PACIFIC STREET
P. O. BOX 3737
PORTLAND, OREGON 97208

Reference: RBS

May 18, 1967

Memorandum:

To: Regional Director, Bureau of Reclamation, Sacramento, California

From: ACTING Regional Director, Bureau of Sport Fisheries and Wildlife, Portland, Oregon

Subject: Paskenta-Newville unit, Sacramento River division, Central Valley project, California

This is our detailed report on effects the unauthorized Paskenta-Newville unit would have on fish and wildlife resources. This report has been prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and is based on engineering information provided by your office through March 1967.

This report has been reviewed and concurred in by the California Department of Fish and Game, as indicated in the attached copy of a letter from Director Walter T. Shannon, dated March 31, 1967.

The monetary values assigned in this report to recreational-type fish and wildlife benefits are based on criteria contained in Supplement No. 1 to Senate Document No. 97.

PROJECT DESCRIPTION AND OPERATION

Purposes to be served by the Paskenta-Newville unit include irrigation, flood control, fish and wildlife enhancement, and recreation.

Major features of the unit are Paskenta Reservoir, to be located on Thomes Creek about two miles southwest of Paskenta, and Newville Reservoir, to be located on North Fork Stony Creek about five miles

upstream from existing Black Butte Reservoir. Newville Reservoir would be adjacent to and southeast of Paskenta Reservoir. The reservoir sites are in Tehama and Glenn Counties in the foothills of the east slope of the Coast Range. The local area to be served with irrigation water from Paskenta Reservoir lies north of Black Butte Reservoir and is centered generally around Flournoy and Henleyville; that to be served from Newville Reservoir lies generally along North Fork Stony Creek west of Black Butte Reservoir.

At normal pool elevation, Paskenta Reservoir would store 130,000 acre-feet of water with a surface area of 1,860 acres. Newville Reservoir, at normal pool elevation, would store about 2,980,000 acre-feet of water with a surface area of 16,550 acres. Minimum pools for Paskenta and Newville Reservoirs are sized at about 17,000 acre-feet and 100,000 acre-feet, respectively. Paskenta Reservoir would furnish most of the water for the unit. Surplus supplies from Paskenta Reservoir would be channeled through a saddle spillway to Newville Reservoir. It would take Newville Reservoir about 25 years to fill. About 12,000 acres of arable land would be provided with irrigation water from Paskenta and Newville Reservoirs. Newville storage would be used also to firm up Central Valley project requirements in dry years.

Irrigation releases from Paskenta and Newville Reservoirs would be conveyed to the local service areas in canals directly from outlet works in the dams. Releases from Newville Reservoir for Central Valley project needs would be made directly to North Fork Stony Creek, then routed through Black Butte Reservoir and into a separate conveyance channel extending from Black Butte Reservoir to the Sacramento River.

FISH

Without the Project

This analysis considers Thomes Creek from the Paskenta Reservoir site downstream about 27 miles to the proposed Tehama-Colusa Canal siphon, and North Fork Stony Creek from the Newville Reservoir site downstream about 5 miles to Black Butte Reservoir. Fishery development in Thomes Creek, downstream from the Tehama-Colusa Canal siphon, is evaluated in our Bureau's January 5, 1967 memorandum on Tehama-Colusa Canal, a feature of the Sacramento River division, Central Valley project, which is now under construction.

Streamflows are intermittent in Thomes and North Fork Stony Creeks in the reservoir sites and downstream reaches. Flow is heaviest in late fall and winter and, commonly, no flow is recorded in late summer and early fall.

Game fish populations are insignificant within the project-influenced portions of Thomes and North Fork Stony Creeks. Few trout are found in Thomes Creek as far downstream as the Paskenta site. Fall-run chinook salmon have been known to enter Thomes Creek occasionally during wet years, but their use of the stream is generally negligible. Nongame fish present in these streams include Sacramento suckers, Sacramento squawfish, California roach, specked dace, green sunfish, and carp.

Existing angling use is negligible on Thomes and North Fork Stony Creeks in the reservoir sites and downstream reaches, and no change is expected during the 1975-2074 analysis period.

With the Project

Portions of Thomes and North Fork Stony Creeks would have increased flows during the irrigation season, resulting from return flows from the local service areas. During the remainder of the year, most of the runoff would be stored in the reservoirs, although small releases are planned to maintain streamflows for downstream rights, including recharge. Releases during the November through March period would average 1,600 acre-feet a month. These changes would have little effect on fish resources, and angling use would continue to be minor during the analysis period.

Under existing conditions, Black Butte Reservoir water becomes turbid seasonally due to inflow of turbid water from Stony Creek. Dry year releases from Newville Reservoir, to meet Central Valley project needs, could possibly be turbid also if they are drawn from a low level outlet. However, it is not possible quantitatively to determine whether this potential increase in turbidity would have an appreciable effect on existing fishery values of Black Butte Reservoir and the Sacramento River.

Fishing use of Paskenta and Newville Reservoirs would be negligible without fish stocking and with provision of only minimum public-use facilities as provided by P. L. 89-72.

Discussion

Considerable fishing use would occur at Paskenta and Newville Reservoirs with preproject chemical treatment of the reservoir sites and upstream drainage areas, fish stocking, and provision of angler facilities including parking areas, sanitary facilities, and boat launching ramps. We estimate that under these conditions Paskenta and Newville Reservoirs would support average annual use of 24,000 angler-days and 60,000 angler-days, respectively, during the analysis period. These estimates are based on project operation studies which indicate that once during the

100-year analysis period, Newville Reservoir would be drawn down to about 150,000 acre-feet and then refilled. The drawdown would occur over a twelve-year period, and refilling would take another twenty-five years. Drawdown beginning in 2009 was assumed in deriving average annual fishing use. Trends in fishing use from which average annual figures derive, are shown in table 1.

Table 1. Summary of with-project trends in fishing use (with fish management and angler facilities) and key-year use levels used to derive average annual fishing use estimates, Paskenta and Newville Reservoirs.

PASKENTA RESERVOIR

Year	Angler-days 1/ 2/
1975	0
1976	2,550
1985	25,500
2074	25,500

NEWVILLE RESERVOIR

Year	Angler-days 1/ 2/
1975	0
1976	0
1977	3,565
1999	82,000
2009	82,000
2021	19,500
2046	82,000
2074	82,000

1/ Straight line relationship between years.
2/ Value per angler-day is $1.

The total cost of preproject chemical treatment for both reservoir sites and upstream drainage areas would be $3,000. Initial, once-only warmwater fish stocking costs would be $4,500 and $7,500, respectively, for Paskenta and Newville Reservoirs.

Total capital cost for boat launching ramps, parking areas, and sanitary facilities for both reservoirs would be $132,000. Of this amount, $48,000 should be expended prior to 1976. The remainder should be expended in increments of $39,000 in 1985 and $45,000 in 1999. About 79

per cent of these costs would be required for Newville Reservoir facilities. Estimated annual operation, and maintenance costs would be $2,900 initially, increasing to $5,200 in 1986 and $7,900 for the 2000-2074 period.

Capital costs of angler facilities, preproject chemical treatment, and initial stocking of warmwater fish would be shared under provisions of P. L. 89-72.

Establishment of fall-run chinook salmon in Thomes Creek downstream from Paskenta Dam has been evaluated in connection with the Paskenta-Newville unit. Such a program would require extensive stream rehabilitation, land acquisition, access roads, and annual releases of large volumes of water from Paskenta Reservoir. A multi-level outlet structure would be required in Paskenta Dam to provide proper water temperatures for salmon propagation.

Considering the seasonal availability of stored water in Paskenta Reservoir under the proposed operation, it is questionable that fishery releases of the proper temperature could be maintained even with a multi-level outlet structure. Considering further the initial and annual costs of multi-level outlets, water storage, and other necessary features, and the extent of benefits that would be realized, it is concluded that establishment of fall-run chinook salmon in Thomes Creek is economically infeasible with Paskenta-Newville unit as planned. Consequently the necessary works and facilities are not recommended in this report.

We understand that the Federal Water Pollution Control Administration will recommend installation of multi-level outlet structures in both Paskenta and Newville Dams for water quality control now and in the future when imported water is routed through the system to meet Central Valley project needs. The multi-level outlets would be of value in preserving future fishery enhancement potential with expansion of the local project to include reregulation of water imported to the basin. Importation and routing of large volumes of water through the system in the future could result in substantial fishery enhancement benefits provided the reservoirs are operated so as to maintain proper water temperatures and the timing and quantity of reservoir releases are consistent with anadromous fish requirements.

Incorporation of a multi-level outlet structure in Newville Dam initially would also allow drawing of the least turbid water from the reservoir. This would counter the possibility of aggravating the present seasonal turbidity in Black Butte Reservoir and conveying turbid water releases to the Sacramento River with a low-level outlet.

With information presently available, it is impossible to predict whether low-level releases from Newville Reservoir would be sufficiently

turbid to materially affect existing fishery values of Black Butte Reservoir and the Sacramento River. Since there is some indication that such releases might be turbid, the possibility of impairing existing values does exist. Therefore, a study should be conducted to determine whether incorporation of multi-level outlet structures in Paskenta and Newville Dams is justified with the unit as planned.

Since conflicts may arise among the many competing uses for reservoir land and water areas, a land and water use zoning plan should be developed in connection with overall planning for project operation to insure that certain areas and/or certain periods would be available for fishing (and hunting, and other wildlife purposes) without conflicting with general recreation. Such a plan should be developed cooperatively by the Bureau of Reclamation, National Park Service, U. S. Forest Service, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife.

Retention of natural vegetation in Paskenta and Newville Reservoirs, particularly in the littoral zone, would improve conditions for game fish by providing cover and minimizing turbidity. Plans for clearing the reservoir sites prior to impoundment should be developed cooperatively by the Bureau of Reclamation, National Park Service, U. S. Forest Service, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife.

WILDLIFE

Without the Project

Black-tailed deer are the only big game animals of importance in the project area of influence, and few are resident in the reservoir sites all year. However, large numbers of deer inhabit the higher elevations of the Coast Range within the Mendocino National Forest, west of the reservoir sites. A portion of the Alder Springs deer herd, which ranges from near Redding southward into Colusa County, makes intensive use of the Paskenta Reservoir site as a wintering area. Deer also winter in the Newville Reservoir site, but this area is not considered key winter range.

Most of the land within Paskenta and Newville Reservoir sites is privately owned, and hunting effort for the few resident deer which occur there is limited. However, during certain years of early winter and/or extended hunting seasons, hunting effort for migratory deer in these areas is appreciable, and harvest is significant. The Alder Springs deer herd supports considerable hunting effort in the Mendocino National Forest and on other public land outside the reservoir sites. We estimate that during the 1975-2074 period, hunting effort supported by the Alder Springs deer herd will average about 10,000 hunter-days annually.

Upland game occurring in the general project area includes California quails, ring-necked pheasants, mourning doves, band-tailed pigeons, gray squirrels, brush rabbits, and desert cottontails. Hunting effort

for these species in the reservoir sites and downstream reaches will average about 350 hunter-days annually during the analysis period.

Waterfowl use of the project area is limited. Species which do occur include mallards, wood ducks, cinnamon teals, American widgeons, pintails, Canada geese, and white-fronted geese. Hunting effort for waterfowl in the project area is expected to average about 260 hunter-days annually during the analysis period.

Fur animals found in the project area include bobcats, coyotes, raccoons, badgers, gray foxes, weasels, minks, muskrats, and skunks. Harvest of these animals is minor and is not expected to change during the analysis period.

With the Project

Paskenta Reservoir would inundate about 1,860 acres at normal pool elevation, of which a major portion is key winter range used by a portion of the Alder Springs deer herd. The overall result of this loss of winter range would be a sharp decline in the affected deer herd and a corresponding reduction in hunting effort on public lands outside the reservoir site. Without compensatory measures, we estimate that the Alder Springs deer herd would support an average of 5,000 hunter-days annually during the analysis period, or an average annual reduction of 5,000 hunter-days from hunting effort anticipated without the project.

Although the reservoirs would inundate lands presently used by upland game, irrigation of the dry-farmed lands in the local service areas would result overall, in a moderate increase in upland game, particularly pheasants, doves, and quails. We estimate that hunting effort for upland game would average about 1,050 hunter-days annually during the 1975-2074 period, representing a project related increase in average annual use of 700 hunter-days. This enhancement increment derives from expected trends in increased annual hunting use of 400 hunter-days in 1975, increasing in a straight line to 800 hunter-days in 2024 and thereafter remaining constant. Each new hunter-day is valued at $2.50.

An increase in waterfowl populations would result also with irrigation of the local service areas. During the analysis period, hunting effort for waterfowl would average about 525 hunter-days annually, representing a project related increase in average annual use of 265 hunter-days. This enhancement increment derives from expected trends in increased annual hunting use of 150 hunter-days in 1975, increasing in a straight line to 300 hunter-days in 2024 and thereafter remaining constant. Value per new hunter-day is $3.50. The reservoirs would also provide new resting areas for waterfowl which would result in additional, unevaluated benefits.

Irrigation of dry lands in the local service areas would permit a slight increase in muskrat and mink populations, thereby offsetting losses of fur animal habitat in the reservoir sites. Overall, fur animal populations would not change appreciably, and harvest would be minor during the analysis period.

Discussion

In order to offset the loss of deer winter range in the Paskenta Reservoir site and the attendant decline in deer numbers and huntin effort, it will be necessary to acquire and develop certain lands the general reservoir area. Public lands in the area have been examined and, because of unsuitable elevation, slope, and other physical characteristics, have been found generally to be of little or no value for the purpose of offsetting winter range losses. Fee title acquisition of about 2,680 acres of private land, as described in table 2 below, and development on about 650 of these acres would provide suitable replacement winter range and would fully compensate for losses anticipated with the project. The 2,680 acres were selected in deference to land needs for general recreation purposes. Therefore, if the present land acquisition plan for general recreation is altered, we will review and revise land requirements for wildlife loss prevention measures. The requirement of 2,680 acres is based primarily on the need to prevent further encroachment on winter deer range and, secondarily, on the fact that developable land in the general area is in short supply.

Development would consist mainly of site preparation and seeding of selected grasses, forbs, and browse to provide additional deer food. Some browse manipulation might also be accomplished to increase deer food supplies on the area. Capital and annual costs of these measures would be project costs.

Land acquisition cost is estimated at $268,000. Cost of developing 650 acres is estimated at about $33,000. Cost of administering the acquired lands and maintaining developments would be about $7,500 annually.

Of the 2,680 acres that would be acquired, 1,000 acres are located within the exterior boundary of Mendocino National Forest. Those lands would be administered as a part of the forest as required by section 3 (f) of the Fish and Wildlife Coordination Act. The various land parcels included in the 2,680 acres form a relatively compact, managable unit, and it is desirable and logical, therefore, that they be administered by a single agency. Since the U. S. Forest Service would administer the lands within the forest boundary, the Regional Forester has agreed, subject to approval by the Chief of the Forest Service, that his agency would also administer acquired mitigation lands outside the forest boundary.

The 2,680 acres would be managed primarily to support wildlife. The U. S. Forest Service would initiate and maintain proposed wildlife developments in accordance with a mutually agreeable program developed cooperatively by that agency, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife.

Table 2. Description of private lands that should be acquired in fee title to offset loss of deer winter range in Paskenta Reservoir site.

Mt. Diablo Meridian, California	Acres
T. 23 N., R. 7 W.	
Section 27 W½NE¼, N½SE¼	160
Section 23 S½	320
Section 22 W½, SW¼NE¼, NW¼SE¼	400
Section 15 W½SW¼	80
Section 21 N½NW¼, NE¼NE¼	120
Section 16	640
Section 9	640
Section 17 NW¼	160
Section 18 E½NE¼	80
Section 7 E½SE¼	80
Total	2,680

RECOMMENDATIONS

It is recommended:

1. That the report of the Regional Director, Bureau of Reclamation, include the conservation, improvement, and development of fish and wildlife resources among the purposes for which the project is to be authorized.

2. That, to enhance reservoir fisheries, project funds be provided for (a) preproject chemical treatment of Thomes and North Fork Stony Creeks and tributaries upstream from Paskenta and Newville Reservoir sites: $3,000, (b) stocking of warmwater fish in Paskenta and Newville Reservoirs: $12,000, and (c) parking areas, boat launching ramps, and sanitary facilities at Paskenta and Newville Reservoirs: $48,000 prior to 1976; $39,000 in 1985; and $45,000 in 1999. Fifty per cent of these costs would be considered nonreimbursable federal costs. Non-federal public bodies would be required to fund the other 50 per cent and all necessary annual operation, maintenance, and replacement costs associated with the required facilities: $2,900 annually through 1985; $5,200 annually 1986-1999, and $7,900 annually 2000 to 2074.

Chemical treatment would be accomplished by methods and materials acceptable to the Secretary of the Interior, the Bureau of Reclamation, Bureau of Sport Fisheries and Wildlife, and the California Department of Fish and Game.

3. That the Bureau of Reclamation conduct the necessary studies to determine the need and justification for incorporation of multi-level outlet structures in Paskenta and Newville Dams with the unit as planned, with the ultimate objective of providing adequately for the protection of existing fishery values in Black Butte Reservoir and the Sacramento River.

4. That the report of the Regional Director, Bureau of Reclamation, appropriately provide for the development of a land and water use zoning plan in connection with overall planning for the project operation to insure that certain areas and/or certain time periods will be available for fishing, hunting, and other wildlife purposes without conflicting with general recreation. It is further recommended that the land and water use plan be developed cooperatively by the Bureau of Reclamation, National Park Service, U. S. Forest Service, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife.

5. That plans for clearing vegetation from Paskenta and Newville Reservoir sites be developed cooperatively by the Bureau of Reclamation, National Park Service, U. S. Forest Service, California Department of Fish and Game, and Bureau of Sport Fisheries and Wildlife.

6. That control programs employing chemical herbicides or pesticides on project lands or waters be developed in cooperation with the California Department of Fish and Game, Public Health Service, Federal Water Pollution Control Administration, and Bureau of Sport Fisheries and Wildlife.

7. That 2,680 acres of private land as described in table 2 of this report, be acquired in fee title at project cost (about $268,000) to compensate for the loss of wildlife habitat inundated by Paskenta Reservoir. It is further recommended that $33,000 be provided as a project cost to develop 650 acres of the acquired lands to provide additional deer food and that annual costs of about $7,500 be provided as project costs for administering the acquired lands and maintaining developments. The $33,000 specified for development work should be provided from project construction funds so that developments can proceed concurrently with project construction.

The U. S. Forest Service would administer all the acquired lands and initiate and maintain wildlife developments in accordance with a mutually agreeable program developed cooperatively by that agency, the California Department of Fish and Game, and the Bureau of Sport Fisheries and Wildlife.

8. That all capital, operation, and maintenance costs of mitigation measures recommended as project costs be treated in the same manner as other project joint costs and allocated among the beneficial purposes of the project.

9. That the following language be incorporated in the recommendations of the report of the Regional Director, Bureau of Reclamation:

(a) "That additional detailed studies of fish and wildlife resources affected by the project be conducted as necessary, after the project is authorized, in accordance with section 2 of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.); and that such reasonable modifications in the authorized project facilities be made by the Secretary of the Interior as he may find appropriate for the conservation, improvement, and development of these resources."

(b) "That federal project lands and waters be open to public use for fishing, hunting, and related uses except for sections reserved for safety, efficient operation, or protection of public property and except for certain areas or periods where closures may be found necessary by the California Department of Fish and Game and the Bureau of Sport Fisheries and Wildlife to conserve or develop fish and wildlife resources."

(c) "That leases of federal lands in the project area reserve the right of public use of such land for hunting and fishing except for sections reserved for safety, efficient operation, or protection of public property."

This report is based on engineering data and information provided by your Bureau through March 1967. We would appreciate notification of any change or refinement of the engineering plan so that consideration may be given to the revision of this report.

Please notify us of your proposed actions regarding our recommendations. Thank you for the cooperation extended by your staff during the preparation of this report.

ACTING Regional Director

Attachments

RONALD REAGAN
Governor

STATE OF CALIFORNIA—RESOURCES AGENCY

DEPARTMENT OF FISH AND GAME
1416 NINTH STREET
SACRAMENTO, CALIFORNIA 95814

March 31, 1967

Mr. Paul T. Quick, Regional Director
Bureau of Sport Fisheries and Wildlife
101 N. E. Lloyd Boulevard
Portland, Oregon 97208

Dear Mr. Quick:

We have reviewed your revised draft report on Paskenta-Newville Unit, Lower Trinity River Division, North Coast Project. We understand that the project you have evaluated is a local water supply development proposal which does not contemplate interbasin water transfer, the project title notwithstanding.

We concur in your report insofar as it addresses a local water supply development. We would not expect the same findings and recommendations to apply equally well to an interbasin water transfer project.

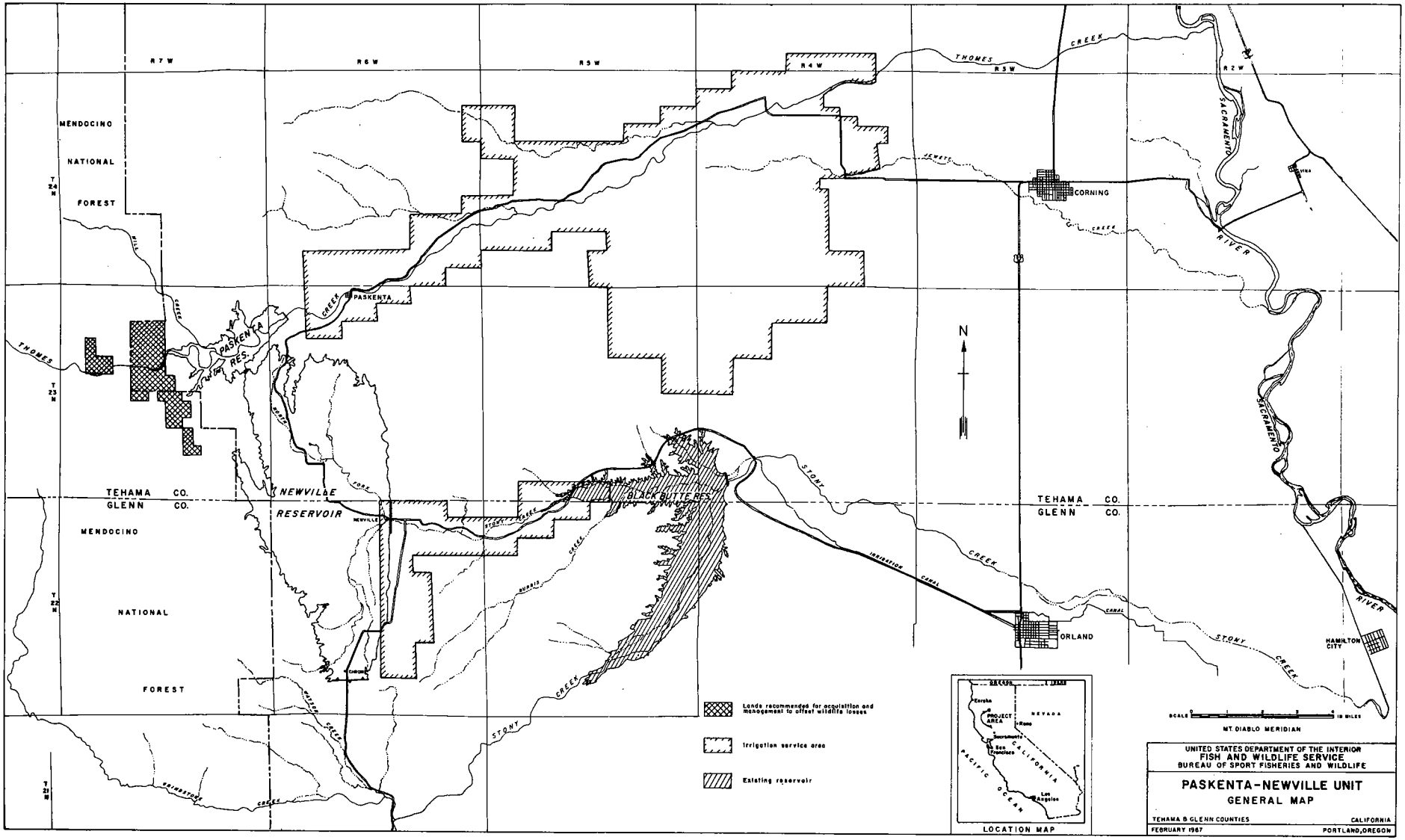
In either event, however, we approve most heartily of your recommendation that the Bureau of Reclamation determine the need for multi-level intake facilities at the Paskenta and Newville dams. We are quite certain that such facilities would be required to protect downstream values in the event that the plan of development is modified to accommodate interbasin water transfer and may well be required in a project utilizing native water supplies.

Thank you for the opportunity to review and comment upon your report.

Sincerely,

Director

1107-0A-208-1



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

PASKENTA-NEWVILLE UNIT
GENERAL MAP

TEHAMA & GLENN COUNTIES — CALIFORNIA

FEBRUARY 1967 — PORTLAND, OREGON

BUREAU OF OUTDOOR RECREATION

PASKENTA–NEWVILLE

UNIT

Report of the Regional Director

Pacific Southwest Region

Bureau of Outdoor Recreation

Department of the Interior

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PACIFIC SOUTHWEST REGIONAL OFFICE
BOX 36062
450 GOLDEN GATE AVENUE
SAN FRANCISCO, CALIFORNIA 94102

IN REPLY REFER TO:

D6427 CAL

November 6, 1967

Memorandum

To: Regional Director, Region 2, Bureau of Reclamation

From: Acting Regional Director

Subject: Recreation Feasibility Study of Paskenta-Newville Unit, Sacramento River Division, Central Valley Project, California

Attached are five copies of our report of the above study. Copies are also being sent to the agencies listed below.

E. Winton Perkins

Attachment (5)

cc: Director, BOR (5)
All Regional Directors, BOR (2)
Regional Director, Region 1, Bureau of Sport Fisheries and Wildlife (2)
Field Supervisor, Division of River Basin Studies, BSFW, Sacramento (2)
Regional Director, Region 5, Forest Service (2)
Forest Supervisor, Forest Service, Willows, California (5)
Regional Director, Western Region, National Park Service (5)
State Director, Bureau of Land Management, Sacramento (2)
District Manager, Bureau of Land Management, Redding (2)
Regional Engineer, Federal Power Commission, San Francisco (1)
R.D., Federal Water Pollution Control Administration, San Francisco (2)
Regional Health Director, Public Health Service, San Francisco (1)
State of California, State Director, Public Health Service, Berkeley (1)
State of California, Resources Agency, ATTN: Mr. Wm. Toomey (5)

A FEASIBILITY REPORT

on the

RECREATION ASPECTS

of the

PASKENTA-NEWVILLE UNIT

SACRAMENTO RIVER DIVISION

CENTRAL VALLEY PROJECT

TEHAMA AND GLENN COUNTIES

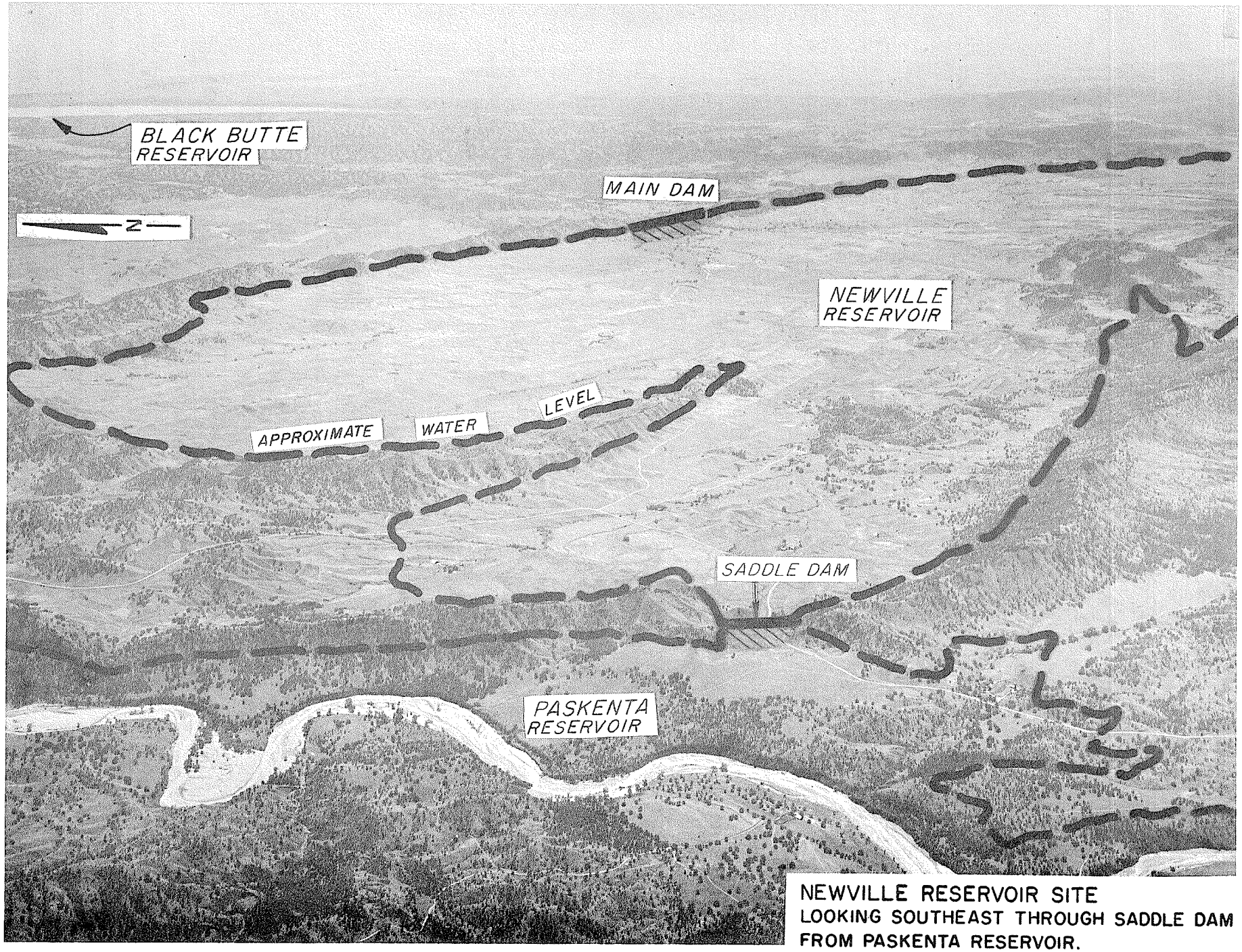
CALIFORNIA

United States Department of the Interior
BUREAU OF OUTDOOR RECREATION
Pacific Southwest Region
San Francisco, California

November 1967

Artist's view of Paskenta Dam and Reservoir

PLATE I



NEWVILLE RESERVOIR SITE
LOOKING SOUTHEAST THROUGH SADDLE DAM
FROM PASKENTA RESERVOIR.

PLATE II

SYLLABUS

This report has been prepared at the request of the Bureau of Reclamation under authority of Public Laws 88-29 and 89-72. The purpose is to identify and describe the recreation potential of the project and to provide a feasibility grade plan of recreation development and benefit-cost analysis.

This project is located in the semi-wooded foothills of the coast mountain ranges and is characterized as being largely grazing land having a hot dry climate during the recreation season. The project consists of Paskenta Reservoir with about 1,900 surface acres, and a Newville Reservoir with about 16,600 surface acres. Water levels at Paskenta Reservoir would be relatively stable and surplus water would be transported to adjacent Newville Reservoir, which would require about 25 years to initially fill.

A review of the recreation demand and supply for the market area indicates some degree of unsatisfied demand for water-oriented recreation in the project area.

The project area would be well suited for recreation development from esthetic, water quality, and land capability standpoints. Paskenta Reservoir, having a relatively stable pool level, would provide more potential for development of recreation facilities early in the project than would Newville Reservoir.

General recreation use at the Paskenta-Newville Unit is estimated at 137,000 recreation days annually at year 1 increasing to 667,500 days

by year 50. The recreation developments should include facilities for boating, fishing, camping, swimming and picnicking. Projected use to 50 years would require costs for recreation development totalling $5,006,-000, including recreation land. The recreation developments would complement recreation on the Mendocino National Forest, which lies adjacent to project lands. The Forest Service would be the logical agency to assume the administration of recreation in connection with the project.

The Bureau of Outdoor Recreation recommends that recreation be a project purpose; that the proposed recreation plan be included in the project plan; and that the Forest Service develop and administer the recreation facilities as proposed.

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Authority

This report is prepared in response to a request by the Bureau of Reclamation, Region 2, Sacramento, California, dated April 28, 1965, asking the Bureau of Outdoor Recreation to evaluate the recreation aspects of the proposed Paskenta-Newville Unit.

The basic authority for the preparation of this report is contained in Public Law 88-29 (77 Stat. 49) approved May 23, 1963, and is in conformance with the Federal Water Project Recreation Act, Public Law 89-72 (79 Stat. 213).

Purpose

The purpose of this report is to identify and describe the recreation potential of the proposed Paskenta-Newville Project, enabling the Bureau of Reclamation to determine whether including recreation as a project purpose is economically justified and feasible. The report also provides a plan of recreation development.

Scope

This report is of feasibility grade and is considered suitable for consideration by Congress in connection with authorization of the project.

Background

In 1960, a feasibility study of the Paskenta site, made by a private engineering concern for the Tehama County Flood Control and Water Conservation District, found that a multiple purpose project was feasible. The site presently is being studied by the Bureau of Reclamation and the State of California. Recreation planners representing California, the Forest Service and the Bureau of Outdoor Recreation have developed a coordinated analysis.

During the preparation of this report, the following documents were consulted:

California Public Outdoor Recreation Plan, 1960.

California Recreation and Parks Study, 1965.

California Department of Water Resources, Bulletin No. 136, North Coastal Area Investigation, 1965.

California Department of Parks and Recreation, Reconnaissance Report: Paskenta-Newville Reservoir, 1967.

Forest Service, Multiple Use Impact Survey for Proposed Glenn Reservoir Complex, Mendocino National Forest, 1964, and review draft Impact Survey Report Stage II, January, 1967.

Bureau of Land Management, Impact Report, Paskenta-Newville Project, June, 1967.

Selected publications of the Outdoor Recreation Resources Review Commission, 1962.

Basic Assumptions

The following basic assumptions have been made regarding this analysis:

1. The population of the market area will continue to increase throughout the period of analysis.
2. The per capita use by travel zones of the Paskenta-Newville

Unit would be the same as those for Black Butte Reservoir for the period data are available.

3. Generally, the water-oriented recreation activities occurring at Black Butte Reservoir would be those desired at Paskenta and Newville Reservoirs in approximately the same percentages of various types of use.

4. Participation in outdoor recreation activities will be similar to those forecasted by the Outdoor Recreation Resources Review Commission.

5. Year I of the project operation would be 1976.

Acknowledgements

Information used in this report was obtained with the cooperation of various State and Federal agencies. The Forest Service, Bureau of Sport Fisheries and Wildlife, Bureau of Reclamation, Bureau of Land Management and California Department of Parks and Recreation have been particulary helpful.

GENERAL DESCRIPTION OF THE STUDY AREA

Physical Aspects

Project Location - The Bureau of Reclamation's plan for the Paskenta-Newville Unit proposes two contiguous reservoirs about two miles southwest of the community of Paskenta, and 23 miles west of Corning, California, Townships 22 and 23 North, Ranges 6-7 West, Mt. Diablo Base and Meridian. The smaller, Paskenta Reservoir, would be located on Thomes Creek in Tehama County and the larger, Newville Reservoir, would be just to the south on North Fork Stony Creek, Tehama and Glenn Counties. Both sites are in the foothills of the east slope of the coast mountain ranges (Plate III). These reservoirs would be about 175 miles north of the San Francisco and Sacramento metropolitan areas.

Project Description - The Paskenta-Newville Unit would contribute water to the Central Valley Project, initially, from local watershed supplies, and possibly in the future, from transported water from the North Coast. The hydrology used as the basis for present analysis assumes no import supplies of water from the North Coast. However, even if water importation were assumed, little effect on the recreation analysis would be expected, since the importation would result mainly in a greater flow-through rate rather than in pool stabilization.

In addition to serving as a water-transfer medium, the Unit would include flood control, municipal and industrial water supply, irrigation, recreation and fish and wildlife enhancement as project purposes.

Operating characteristics for the two reservoirs are given in Table 1.

Paskenta Reservoir would be the smaller and more stable of the two reservoirs, having a surface area of 1,900 acres at full pool elevation. Yearly vertical fluctuation would be less than 15 feet during the recreation season (April-September), about 65 percent of the time. Fluctuation during this period would exceed 50 feet only four out of 45 years. The average recreation pool would contain 1,660 acres at elevation 990 feet.

Paskenta Reservoir would furnish most of the water for the Unit, and surplus supplies would be channelled through a saddle-dam spillway into Newville Reservoir. Releases from Paskenta Reservoir would be made to Thomes Creek for water rights, including winter stream maintenance flows, and to the Paskenta South Canal for irrigation. Water quality is expected to be adequate for recreation; however, a high degree of silt deposition is anticipated which may affect fish production. This siltation would result from extremely high flood flows in Thomes Creek.

Newville Reservoir would have a very limited drainage area and, therefore, would be dependent upon surplus flows from Paskenta Reservoir for water supplies. Based on past hydrology, the Bureau of Reclamation estimates that about 25 years would be required to fill this large reservoir, at which time it would have a surface area of about 16,600 acres. This water would be used to augment dry-year flows in the Sacramento River by releases to North Fork Stony Creek, through Black

Table 1
Project Data
Paskenta-Newville Unit
Central Valley Project, California

Maximum Pool	Paskenta Reservoir	Newville Reservoir
Elevation in feet	1,006	975
Storage in acre-feet	130,000	2,986,000
Surface area in Acres	1,900	16,600
Shoreline in miles	15	40
Average Recreation Pool (April to September) 1/		
Elevation in feet	990	not applicable2/
Storage in acre-feet	105,000	
Surface area in acres	1,660	
Minimum Pool		
Elevation in feet	905	704
Storage in acre-feet	17,600	100,000
Surface area in acres	400	3,000
Drainage area in square miles	191	55

1/ Average over 45 years of record

2/ Expected to require at least 25 years to fill to maximum pool with continued long term fluctuations from minimum pool to maximum pool.

Butte Reservoir and the Black Butte-Sacramento River conveyance channel. After Newville Reservoir reached maximum storage capacity, anticipated water requirements would result in a drawdown to miniumum pool once in about 100 years, followed by a slow refilling period. Although the long term water level fluctuation would be great, the yearly fluctuation generally would not be more than about 30 feet. In 38 of 45 years, surface level would fluctuate less than ten feet during the April to September recreation season. Benefits due to augmented downstream flows accrue principally to the fishery purpose. General recreation benefits are insignificant.

Study Area - Aerial photographs showing the two reservoir sites are located in the front of the report (Plates I and II). The Paskenta-Newville Unit would be located in the foothills of the coast mountain ranges on the west side of the Sacramento Valley. The dominant present use of the reservoir land is for grazing.

Slopes within the Paskenta Reservoir site are steep with developable bench lands largely at the westerly end. Blue oak and a variety of live oak mixed with scattered digger pine are the dominant tree species providing shade and esthetic appeal. Manzanita, chamise and ceanothus are the dominant shrubs.

Newville Reservoir would be located in a long broad valley with water backing up to steep hills and ridges. The site is a large expanse of grassland nearly devoid of trees and not a particularly attractive recreation site. There is vegetation similar to that found in the

Paskenta site at the higher elevations above maximum pool.

The soils are of the Millsholm and Lodo clay-loam types, derived from a parent shale material. These soils are shallow in the Paskenta area, but should provide an adequate base for recreation development.

The climate of the project area is conducive to recreation activities. Summers are hot and dry, inducing water related activities such as boating and swimming. Temperatures during the summer months frequently approach or exceed 100°F. Lows during the winter months occasionally reach freezing, but, even so, winter daytime temperatures range in the 50's and 60's, encouraging recreational use.

The long spring days provide some of the region's most satisfying recreational opportunities, since the landscape is green and lush from the winter rain. Mean annual precipitation is about 23 inches, 92 percent of which occurs from October through April.

The project area contains 67 recorded archeologic and historic sites. Many of these sites will require an archeologic survey. The National Park Service has presented a report to the Bureau of Reclamation dated December 15, 1966, which indicates this investigation may require as much as $100,000 to complete.

Directly to the west of the project area, the wooded slopes of the coast range rise sharply to elevations over 6,900 feet. These slopes are generally within the Mendocino National Forest which offers a vast tract of recreational land adjacent to the project site.

Some 640,000 recreation days of use were reported in the Mendocino National Forest in calendar year 1965.

Socio-economic Aspects

Agriculture is the economic base for the project area, with grain crops and orchards in the valley, cattle ranching in the foothills, and logging in the mountains. Recreation, also, is important to the area's economy and is based primarily on an abundance of public forested land and abundant fish and game populations.

Tehama and Glenn Counties have growth rates far below that of the State as a whole. The 1960 population for the two-county area was 42,550, an increase of only 23 percent over 1950, while the average State population increased about 49 percent during this decade. Most of the counties' inhabitants live in the small communities and farms of the Sacramento valley. Populations in the other portions of the area are light.

Population projections by the State of California indicate that population increases from 1960-1980 for Glenn and Tehama Counties will be about 12 and 45 percent respectively, much less than the 93 percent predicted for the State as a whole. The State also has estimated that the combined population of the two-county area will be less than 200,000 by 2020. There is every indication that the present agricultural economy will remain fairly stable. The median income in the two counties is somewhat below the State average.

DEMAND, SUPPLY, AND NEEDS

Recreation Market Area

For purposes of this report, the market area is defined as that geographic region which includes the place of origin of 80 percent of the users of a recreation facility. The recreation market area for the Paskenta-Newville Project has been calculated as an area having a radius of 40 miles, using origin data collected at Black Butte Reservoir during 1965. This 4,560-acre Corps of Engineers' reservoir, built for flood control, irrigation and recreation, is located approximately ten miles from the proposed project. It has excellent recreation facilities and provides valuable data for use in making project analyses. Over 84 percent of the recreation users at Black Butte in 1965 came from within a radius of 40 road miles or less. About 8 percent of the use originated at a distance in excess of 100 miles.

Demand

Recreation at reservoirs is becoming a major activity of Californians. In 1965, eighteen million recreation days were experienced at California reservoirs constructed by the Bureau of Reclamation, Corps of Engineers and the State of California. More millions were accommodated at impoundments constructed by water districts, irrigation districts, recreation districts, and private power and water companies. Any body of water open to public use will be used by recreationists.

Data from the California Outdoor Recreation Plan indicate the increasing demand for outdoor recreation in California. The 1960 Statewide population was 15,863,000. Projections by the Department of Finance indicate that 28,137,000 people will be living in California in 1980, an increase of 77.4 percent. The total demand of the people of California for outdoor recreation will increase 104 percent during the period 1960-1980.

Part I of the California Recreation and Parks Study, 1965, part of the State's current comprehensive outdoor recreation plan, contains estimates of potential demand from the two nearby metropolitan areas. Excerpts showing potential demand for various activities are given in Table 2.

Table 2
ESTIMATES OF POTENTIAL RECREATION DEMAND
FOR STANDARD METROPOLITAN STATISTICAL AREAS
Participation Days in millions 1/

	San Francisco-Oakland			Sacramento		
Activity	1960	1970	1980	1960	1970	1980
Picnicking	13.3	18.3	23.2	2.3	3.7	5.2
Camping	6.2	9.0	10.7	.8	1.4	1.8
Riding/Hiking	5.7	8.3	11.2	1.2	2.0	2.9
Swimming	30.1	47.5	61.2	5.9	11.1	15.9
Boating	13.3	14.7	19.7	2.0	3.5	5.3
Sightseeing	26.9	37.4	49.3	4.0	6.7	9.9
	95.5	135.2	175.4	16.2	28.4	41.0

1/ The term "Participation Day" . . .refers to the days or portions of days in which a participant engages in a specific recreation activity, Recreation and Parks Study, Part 1, 1965.

Local demand for recreation can be gauged by attendance at the Corps of Engineers' Black Butte Reservoir, first opened for use in 1964. Recreation use to date is given in Table 3.

Table 3
Recorded Recreational Use
At
Black Butte Reservoir

Year	Annual Use in Recreation Days
1964	107,600
1965	155,820
1966	213,340

Supply

The supply of recreation facilities within the 40-mile market area of the Paskenta-Newville Project is large, and the types of recreation are varied. Table 4 is a list of the more important of these recreation areas.

Information regarding use of some of these recreation facilities is generally available. Based on this information and estimates for the remaining facilities, recreation use of these areas totalled at least 800,000 recreation days in 1966.

There are a number of other areas outside the market area influencing the potential recreation use of the project. The three-reservoir Whiskeytown-Shasta-Trinity National Recreation Area is located about 60 road miles north of the project area. This complex offers excellent outdoor recreation facilities of all types and accommodated 2,900,000 recreation days use in 1966. Lassen Volcanic National Park is

Table 4
Public Outdoor Recreation Opportunities Within a
Radius of 40 miles of Paskenta and Newville Reservoirs

Unit	Distance	Administration	Major Recreation Activities
Black Butte Reservoir	5 miles	Corps of Engineers	all water related activities
Stony Gorge Reservoir	10 miles	Bureau of Reclamation	all water related activities
East Park Reservoir	30 miles	Bureau of Reclamation	all water related activities
Sacramento River	30 miles	Not Applicable	boating, fishing, etc.
Red Bluff Diversion	34 miles	State and Bureau of Reclamation	all water activities except swimming
Mendocino National Forest	adjacent	Forest Service	camping and hunting
Middle Eel Yolla Bolly Wilderness Area	25 miles	Forest Service	wilderness recreation
Sacramento National Wildlife Refuge	40 miles	Bureau of Sport Fisheries and Wildlife	hunting and bird watching

approximately the same distance northeast and received about 463,000 recreation days use that year. The State's 15,500-acre Oroville Reservoir, which will provide recreation by about 1968, will serve approximately 600,000 users annually its first few years and is expected to have an optimum annual use of 6,200,000 recreation days by 2017. This reservoir is less than 60 miles from the project area and will compete for use within the Paskenta-Newville Unit market area.

Needs

The analysis of recreational needs in relation to Paskenta-Newville Reservoirs is based on the comparable existing reservoir method, in this case, Black Butte. Data regarding use and origin at Black Butte provided the basic computations which were correlated with present populations by travel zones. The result was a calculated participation rate for Black Butte in 1966 by travel zones in the market area and beyond.

Similar travel-zone populations were computed for Paskenta-Newville, and, after adjustment for competing facilities discussed above, provided the basis for estimates of recreation use expected at Paskenta-Newville. The build-up of future use shown in Table 6 is based on consideration of predicted participation rates from the ORRRC reports, estimated population trends within the State, and the presence of other recreation facilities within the market area. The participation rate for purposes of this study is expected to increase nearly 1-1/2 times in the first 50 years of project life. Initial per capita use would average as high as five visits per year from those persons living within 20 miles

of the project to about .005 visits per year from those persons residing over 100 miles away.

It is estimated that the Paskenta-Newville Unit would have an initial general recreation use of 137,000 recreation days. The use would continue to increase until it reached 667,500 recreation days in 50 years. These estimates are exclusive of fishing use by the Bureau of Sport Fisheries and Wildlife. It is generally concluded that the unsatisfied demand for recreation in the market area includes swimming, boating, picnicking, fishing and camping.

OUTDOOR RECREATION PLAN

Appraisal of Recreation Potentials

Without the project, the ownership and use of land, the topography, and lack of water severely limit outdoor recreation opportunities. New water areas and public facilities would be a valuable recreation asset.

Paskenta Reservoir would provide a relatively stable 1,660-acre recreation pool of quality water capable of supporting considerable water-oriented recreation. Sufficient land for recreation facilities and access would be available adjacent to the water area. Furthermore, the adjacent wooded foothills of the coast mountain ranges would provide a setting attractive to large numbers of visitors.

Newville Reservoir, although 10 times the water surface of Paskenta Reservoir (16,600 surface acres at maximum pool), would not provide the same scope of recreational use. This large reservoir probably would not fill for about 25 years. After filling, it would be subject to severe drawdowns for extended periods to provide dry-year water requirements. This latter factor would create severe limitations on development of facilities. Many developments would be necessarily of a temporary nature to permit movement required to maintain proximity to the water areas. Also, Newville Reservoir would inundate much of the developable land at full pool. The vast expanse of water and generally treeless shoreline would not have the esthetic appeal of Paskenta Reservoir.

Annual general recreation use of both reservoirs has been estimated at 137,000 recreation days initially, reaching 667,500 days by the 50th year. These estimates are exclusive of fishing use which is estimated

to reach 107,500 angler days by the 25th year. All major types of water-oriented outdoor recreation would be provided, as shown by Table 5.

Establishment of Goals

The area would be developed to fully utilize the potentials of the more stable water surface at Paskenta Reservoir. Major emphasis would be placed on development of access facilities for boating, fishing and swimming with camping and picnic facilities located as to complement these activities. Lands would be purchased and facilities provided to realize the project's optimum recreation potential and, at the same time, minimize damage to the natural landscape.

Recreation developments at Newville Reservoir would be deferred until such time as the operation of the reservoir indicated that construction would be warranted.

Alternatives

There is no practical alternative to the recreation plan presented in this report. Consideration was given to placing these facilities at existing Black Butte Reservoir, administered by the Corps of Engineers, but the alternative is impractical. The Paskenta site, particularly, is more attractive than Black Butte Reservoir, and will draw use, even though visitors would have to by-pass Black Butte Reservoir to reach Paskenta Reservoir

Features of the Plan

The basic plan of development is summarized in Plate IV, the Recreation Land Use Proposal. All major facility development in the first few years would take place in the area indicated in the southwest portion

Table 5

General Recreation Use by Activity
Paskenta and Newville Reservoirs

Activity	Percent of Use	Daily Capacity in Activity Days	
		Year 1	Year 50
Camping	11	317	1,541
Picnicking	30	863	4,206
Boating and Skiing	18	518	2,523
Swimming	22	633	3,084
Sightseeing	18	518	2,523
Hiking	1	29	140
	100	2,878	14,017

of Paskenta Reservoir, designated as Site A. This section would have sufficient shoreline and developable land to support a major portion of the facilities around Paskenta Reservoir. The westerly segment of the initial development proposal would provide suitable lands for campgrounds, including minimum boat launching and swimming facilities for campers. The easterly portion would serve the major day-use pressure and would include the major boat launching facilities, swimming beaches, bathhouses, concessions, and picnic grounds. Separate road systems would isolate the two major types of use. Boat access and boat camping facilities are proposed for the island adjacent to the major use area.

Initially, facilities at Newville Reservoir would be limited to boat access along one or both of the temporary access routes shown in Plate IV. One of these routes utilizes an existing road approaching from the north. The other uses a ridge dipping into the reservoir from the west, toward the southern end of Newville Reservoir. Temporary support facilities would be provided adjacent to the water as the need develops.

Future plans for facilities are indefinite for Newville Reservoir at this time due to the uncertainity of its operations characteristics. Except for boating and fishing, Paskenta Reservoir, with the land which has been proposed, would have the physical capability for the future recreation use estimated for the entire project. However, the quality of recreation experience would be improved if some major facilities were constructed at Newville Reservoir as indicated on Plate IV.

These facilities are provided for in Table 7 and would be built at the discretion of the administering agency, as required.

The potential recreation site at the northernmost end of Newville Reservoir, designated Site B, would be developed to provide major recreation use. Facilities at this site would have value for overflow or backup use from Paskenta Reservoir even if undesirable water levels occurred at Newville.

Portions of the north shore of Paskenta Reservoir, designated Site C, and adjacent islands, have excellent potential for boat-in camping and picnic facilities. Other portions could be developed as a major recreation complex. These facilities are proposed for later development. A road system has been included in the plans to provide automobile access for this development when it is required.

Sites D, E, and F also are scheduled for future development as needs arise. Road access is to be provided for Sites D and E, planned for overnight and day use, respectively, while Site F is proposed as a boat-in camping area.

The natural attributes of the project area should be considered in all project planning so that scenic and esthetic values are highlighted when possible and not needlessly destroyed. Williams Butte, overlooking the entire reservoir complex, should be developed as a scenic overlook. This area is a potential source of rock material for construction purposes. If rock is removed from Williams Butte, a plan of removal which would facilitate the development of road access and

parking at the overlook is recommended. The natural environment along the south side of Williams Butte adjacent to the proposed recreation area should be preserved.

Another natural scenic area of importance is the peninsula extending nearly 1-1/2 miles into Newville Reservoir from the north. This rock formation would provide an esthetic and scenic attraction which could be used for hiking and riding trails. It is recommended that this area not be used for borrow material.

Land required for recreation facilities and for protection of the recreation potentials and scenic attributes is outlined on Plate IV. Included are 6,715 acres which would be required for project operation. In many instances, especially along the west side of Newville Reservoir, land acquisition would provide continuity of public ownership between the project and the Mendocino National Forest.

The proposed recreation land required, in addition to joint purpose lands for project operation, totals 3,885 acres, all within the boundary shown in Plate IV. Approximately 1,370 acres is public land under the jurisdiction of the Bureau of Land Management and the remaining 2,515 acres of private land would be purchased. The Bureau of Sport Fisheries and Wildlife has proposed an additional 2,455 acres of land for mitigation of wildlife losses, generally west of Paskenta Reservoir which are not included within the boundary shown. These wildlife lands would complement other project and recreation land holdings. Recreation land not required for intensive development would be available for production of wildlife and would be open to hunting consistent with other project purposes.

Facilities would be built in increments of 10 years (Table 6). During the initial period, facilities would be constructed to provide for use anticipated at project year 5. Also included in initial costs would be basic high-cost construction, such as major access roads, and primary sanitation and water systems.

The second increment would be planned for year 10, but would provide facilities for use estimated at year 15. This schedule of over and under development would be maintained, thus providing a reasonable balance in anticipating and reacting to increased recreation use.

For purposes of economic analysis, the use, benefits and development costs are considered to remain constant from project year 50 to 100. This is due largely to the degree of inaccuracy which is inherent in such long-range estimates. Although use is expected to increase after year 50, the accuracy of such projection is questionable, and, in any event, 50-year projections, with use assumed to be constant after that time, provide a reasonable indication of the role of recreation in the project.

Suggested Administrative Arrangement

The Bureau of Outdoor Recreation has worked closely with the Forest Service, the Bureau of Land Management, and the State of California in the development of this recreation plan. These organizations are potential administrators of the recreation facilities. The Bureau of Outdoor Recreation recommends that the Forest Service administer the recreation developments at Paskenta and Newville Reservoirs. The Forest Service and the Bureau of Land Management have officially endorsed this proposed arrangement.

Table 6
Summary of Recreation Use, Net Benefits and Costs [1/]
Paskenta and Newville Reservoirs, Paskenta-Newville Unit
Central Valley Project, California

Project Year	General Recreation Days	Angler Days [2/]	Net Benefits Gen. Rec. [3/]	Net Benefits Fishery [2/]	Development Costs [1/ 6/]	O&M Costs [4/]	Replacement Costs [5/]
Note: Figures underlined represent total for specified year. Figures in (parentheses) represent annual increments between specified years. To determine the total for any unspecified year, add the appropriate number of increments to the previous specified year's total. No developments costs accrue between specified years. None of the figures are cumulative. Figures not underlined and not in parentheses represent the total for each year between specified years.							
-2					$ 400,000 [7/]		
-1					1,323,000		
1	137,000	0	$137,000	0		$41,000	$35,700
							35,700
2	140,000	2,550	140,000	$2,550		43,000	
3	141,180	8,665	141,180	8,665		46,000	
	(1,050)	(6,115)	(1,050)	(6,115)		(2,000)	
10	148,530		148,530		436,000	60,000	47,500
	(4,180)		(4,180)			(2,400)	47,500
11		57,585		57,585			
		(3,565)		(3,565)			
20	190,330		190,330		722,000	84,000	67,000
	(14,217)		(14,217)			(4,800)	67,000
25		107,500		107,500			
		(0)		(0)			
30	332,500		332,500		944,000		92,500
	(19,125)		(19,125)				92,500

Table 6 (Cont'd)

Project Year	General Recreation Days	Angler Days	Net Benefits Gen. Rec.	Net Benefits Fishery	Development Costs	O&M Costs	Replacement Costs
35		107,500 (-6,250)		107,500 (-6,250)			
40	523,750 (14,375)		523,750 (14,375)		594,000	180,000 (3,800)	108,500 108,500
47		45,000 (2,500)		45,000 (2,500)			
50	667,500		667,500		647,000	218,000	126,000
72		107,500		107,500			
100	667,500	107,500	667,500	107,500		218,000	126,000

1/ Including cost due to fishing use. Analysis terminated at 50 years. Recommend assuming that the use and benefits remain constant after year 50. Scope of recreation in the project is adequately represented in the 50-year analysis.
2/ Based on estimates supplied by the Bureau of Sport Fisheries and Wildlife.
3/ Computed at $1.00 per recreation day, excluding benefits without the project.
4/ Computed at $.30 per recreation day, including fishing use.
5/ Sinking fund payments based on 3-1/8% interest over 25-year period.
6/ Optimum recreation development costs to year 50 total $4,666,000 which includes $132,000 for parking, launching ramps, and sanitation for fishermen.
7/ Land cost for 2,515 acres totals $400,000.

Table 7
Recreation Development Costs for
Paskenta and Newville Reservoirs
Paskenta-Newville Unit, Central Valley Project, California

Facility	Initial Development Years 1-10 Units	Initial Development Years 1-10 Costs	Subsequent Development Years 11-50 Units	Subsequent Development Years 11-50 Costs	Total Development Units	Total Development Costs
Picnic Units - @ $2,700 per unit, these include grate, table, garbage receptacle, parking and pro-rata share of sanitary and water systems, circulatory roads, power, trails, walks, signs, barriers, landscaping, etc.	92	248,000	336	908,000	428	1,156,000
Camp Units - @ $3,000 per unit, these include same items as picnic units plus parking spurs.	77	231,000	280	840,000	357	1,071,000
Boat Launching Ramps - Avg. 12 x 300 feet concrete @ $3,600 each.	5	18,000	13	47,000	18	65,000
Swimming Facilities						
Beach Development - grading and imported sand in place @ $20,000 per acre.	.5 acre	10,000	1.9 acres	38,000	2.4 acre	48,000
Bathhouse - unit for 10 people with showers and sanitation @ $16,000 each.	1	16,000	4	64,000	5	80,000
Parking Spaces for Swimmers, Sightseers, Boaters and Anglers @ $300 per space.	457	137,000	1,576	473,000	2,033	610,000
Major Access Roads - $110,000 per mile	3 mi.	330,000	2.5 mi.	275,000	5.5 mi.	605,000
Primary Sanitary and Water Systems		30,000		8,000		38,000
Administration Facilities - Residences, Headquarters, Entrance Stations, Maintenance Buildings		38,000		22,000		60,000
Subtotal		1,058,000		2,675,000		3,733,000
Planning, overhead, and Contingencies - 25%		265,000		668,000		933,000
TOTALS		1,323,000		3,343,000		4,666,000

California has informally indicated concurrence.

There are a number of reasons why the Forest Service would be the most logical agency to manage recreation. The reservoirs are located adjacent to the Mendocino National Forest. Only a slight modification in the Forest boundaries would be required to encompass the reservoir lands within the Forest. Project recreation and wildlife lands would provide a continuous Federal ownership between the present Forest boundary and the reservoir, with minor exceptions. Major development areas would be adjacent to present Forest Service lands and would provide recreation opportunities such as boating, swimming and fishing, which are generally lacking in this part of the Mendocino National Forest. The Forest headquarters at Willows and Ranger Station at Paskenta are well located to undertake the management required. Details of transfer, development, and management have not been formulated at this time.

The Bureau of Land Management administers Federal lands outside the Mendocino National Forest in and adjacent to the project area. A total of 1,512 acres of BLM land would be affected by this project, further emphasizing the desirability of Federal administration. Approximately 1,370 acres of this public land would be within the recreation management unit and the remainder would be inundated. These lands are within a Type II planning unit and are to be classed for retention in Federal ownership to meet future public needs. However, these lands lie on the the perimeter of the BLM planning unit.

The State of California has other water-oriented recreation commitments in this area, notably, a park at the Red Bluff Diversion Dam and major

developments at Oroville Reservoir. The State has indicated that it is not interested in submitting a letter of intent at this time, as required by Public Law 89-72.

Tehama and Glenn Counties, where the project is located, have studied the recreation plan and are interested in its development, but not in administration.

EVALUATION

Recreation Benefits

The tangible recreation benefits provided by this project would be in the form of recreation use; initially 137,000 recreation days, building up to 667,500 recreation days by the 50th year. The value of the general recreation day has been established at $1.00. This value is within the guidelines established by Supplement No. 1 to Senate Document 97 (87th Congress, 2nd Session).

There would be no substantial loss of existing general recreation in the area due to the project. Therefore, the net annual benefits are derived by applying the benefit rate directly to the visitation estimates. A summary of general recreation benefits, which total $667,500 at year 50, is shown in Table 6.

Recreation Costs

Recreation development costs, by facility, are summarized in Table 7 and total $4,666,000 over a 50-year period. These costs would be spread over the project period as an initial expenditure for land and development and five subsequent expenditures at 10-year intervals (Table 6). Recreation land costs would total an estimated $400,000 for 2,515 acres. These land costs are relatively low due to Federal ownership of 1,370 acres of the land required. Operation and maintenance costs are calculated at $0.30 per recreation day, and replacement costs at 3-1/8 percent interest over a 25-year replacement period.

By year 50, annual operation and maintenance costs are estimated to be $218,000, and annual replacement costs $126,000, including costs attributable to use by fishermen.

Comparison of Benefits and Costs

Information required to determine the benefit-cost ratio for general recreation as an individual purpose is given in Table 6. It should be noted, however, that cost figures include costs required to provide access and sanitation for anglers, without showing commensurate benefits from these costs as general recreation benefits. Our calculations indicate benefits would exceed the costs. For the purpose of the economic analysis, general recreation would be combined with the fish and wildlife functions as a single purpose and analyzed by the Bureau of Reclamation.

Cost Allocations and Cost-Sharing

Under the assumption that recreation and fish and wildlife will be treated as one purpose for purposes of economic analysis, we have reviewed possible least cost alternatives which would combine the two functions. The alternative which would satisfy the requirements both recreation and fish and wildlife would be a 1,600-acre Paskenta Reservoir with 100,000 acre-feet of storage and a 6,200-acre Newville Reservoir having 325,000 acre-feet of storage. This latter estimate includes storage for carry-over during a 7-year dry period. No detailed cost estimates of this single purpose alternative are necessary, since the costs of such an alternative would easily exceed the benefits. In such a circumstances, the allocation of joint costs to recreation and fish and wildlife will be limited to assigned benefits.

If no Federal agency assumes responsibility for administering the recreation development, or if no non-Federal agency agrees to participate in the construction and management of facilities under Public Law 89-72

(79 Stat. 213), the Law provides that minimum facilities for public health and safety be furnished. These minimum facilities would include turnarounds at ends of existing roadways, barriers and protective rails and essential sanitation.

The lands necessary to protect the recreation potential of the project, as shown in Plate IV, would be acquired as a project cost and held for a period of ten years after construction, during which time any public agency could assume its responsibility under Public Law 89-72 and the recreation facilities constructed.

Most of the recreation use at the project, with minimum facilities, would result from sightseeing. The Bureau of Sport Fisheries and Wildlife estimates that fishery use would be insignificant without a stocking program and access facilities. Boat access would be limited to two existing roads, one terminating at each reservoir.

Estimates of recreation use and benefits under minimum facility conditions are given in Table 8. Minimum facility developments and costs are summarized in Table 9.

Table 8

MINIMUM FACILITIES

SUMMARY OF COSTS AND BENEFITS

for General Recreation

Paskenta and Newville Reservoirs

Year	General Recreation Days	Net 1/ Benefits	Development Costs 4/	O&M 2/ Costs	Replacement 3/ Costs
Note: Underlined figures represent amounts for specified years. Figures in (parentheses) indicate annual increments between specified years. To determine the total for any unspecified year, add the appropriate number of increments to the previous specified year's total. None of the figures are cumulative. Figures not underlined and not in parentheses represent the total for each year between specified years.					
1	6,500	$3,250	$7,000	$1,950	$780
	(582)	(291)		(174)	780
50	35,000	17,500		10,500	780
100	35,000	17,500		10,500	780

1/ Computed at $.50 per recreation day
2/ Computed at $.30 per recreation day.
3/ Sinking fund payments based on 3-1/8% interest over 10-year periods.
4/ Cost of lands to protect recreation potential $400,000.

Table 9

MINIMUM FACILITIES

Development Costs

Paskenta and Newville Reservoirs

Turnaround - minor grading and barriers		$2,500
Chemical Toilets - 8 with fixture each @ $300		2,400
Refuse Barrels - 8 @ $15.00		120
Signs		400
	Subtotal	$5,420
Plans and Contingencies at 25%		1,355
	TOTAL	$6,775
	Rounded	$7,000
	Land Costs	$400,000

VIEWS OF OTHER INTERESTS

Comments on the report have been received from the following agencies:

Forest Service
National Park Service
Bureau of Reclamation
Bureau of Sport Fisheries and Wildlife
Bureau of Land Management
Federal Water Pollution Control Administration
Federal Power Commission
Public Health Service
State of California, Resources Agency
State of California, Department of Health

No major disagreements with the report were expressed. Revisions based on the comments received have been incorporated into the report.

The Forest Service and Bureau of Land Management concur in the recommendation made regarding Forest Service administration of project recreation.

The National Park Service has informed the Bureau of Reclamation that a sum totalling $100,000 would be required for archeologic salvage.

CONCLUSIONS

The study of the Paskenta-Newville Unit has resulted in the following conclusions:

1. A review of the recreation demand and supply for the market area indicates some moderate degree of unsatisfied demand for water-oriented recreation in the project area.

2. The project would be well suited for recreation development from esthetic, water quality, and land capability standpoints.

3. Paskenta Reservoir, having a relatively stable pool level, would provide more potential for development of recreation facilities early in the project than would Newville Reservoir. Moreover, consistency in operational levels would be more characteristic of Paskenta Reservoir. Much of the total project need could be met at Paskenta Reservoir; however, as Newville Reservoir reaches major pool levels, it would have good recreation potential.

4. General recreation use at the Paskenta-Newville Unit is estimated at 137,000 recreation days annually at year 1 and would increase to 667,500 days by year 50.

5. The recreation potential of the project would not be completely utilized within the 100-year project study period due to the limited recreation demand resulting from low population in the market area and other competing recreation opportunities.

6. The recreation developments should include facilities for boating, fishing, camping, swimming and picnicking. Projected use to project year 50 would require costs for recreation development totalling $5,066,000, including recreation land.

7. About 2,515 acres of private land would be required at a cost of $400,000 to preserve the natural and scenic values and to provide room for development. Also, an additional 1,370 acres presently under jurisdiction of the Bureau of Land Management would be included in the recreation management unit.

8. Although the Paskenta-Newville Unit would not be considered of national significance, administration of recreation facilities would be logical for the Forest Service, with a slight adjustment in Forest boundaries being made to incorporate the reservoirs into the Mendocino National Forest. The Forest Service has indicated its willingness to administer the recreation facilities as proposed at Paskenta and Newville Reservoirs and is recommended as the administering agency.

9. The proposed recreation development at the Paskenta-Newville Unit is in accord with the California Public Outdoor Recreation Plan developed by the State of California pursuant to Subsection 5(d) of the Land and Water Conservation Fund Act of 1965 (78 Stat. 897).

RECOMMENDATIONS

The Bureau of Outdoor Recreation recommends:

1. That recreation be made a project purpose and the recreation program proposed in this report be included in the project plan.

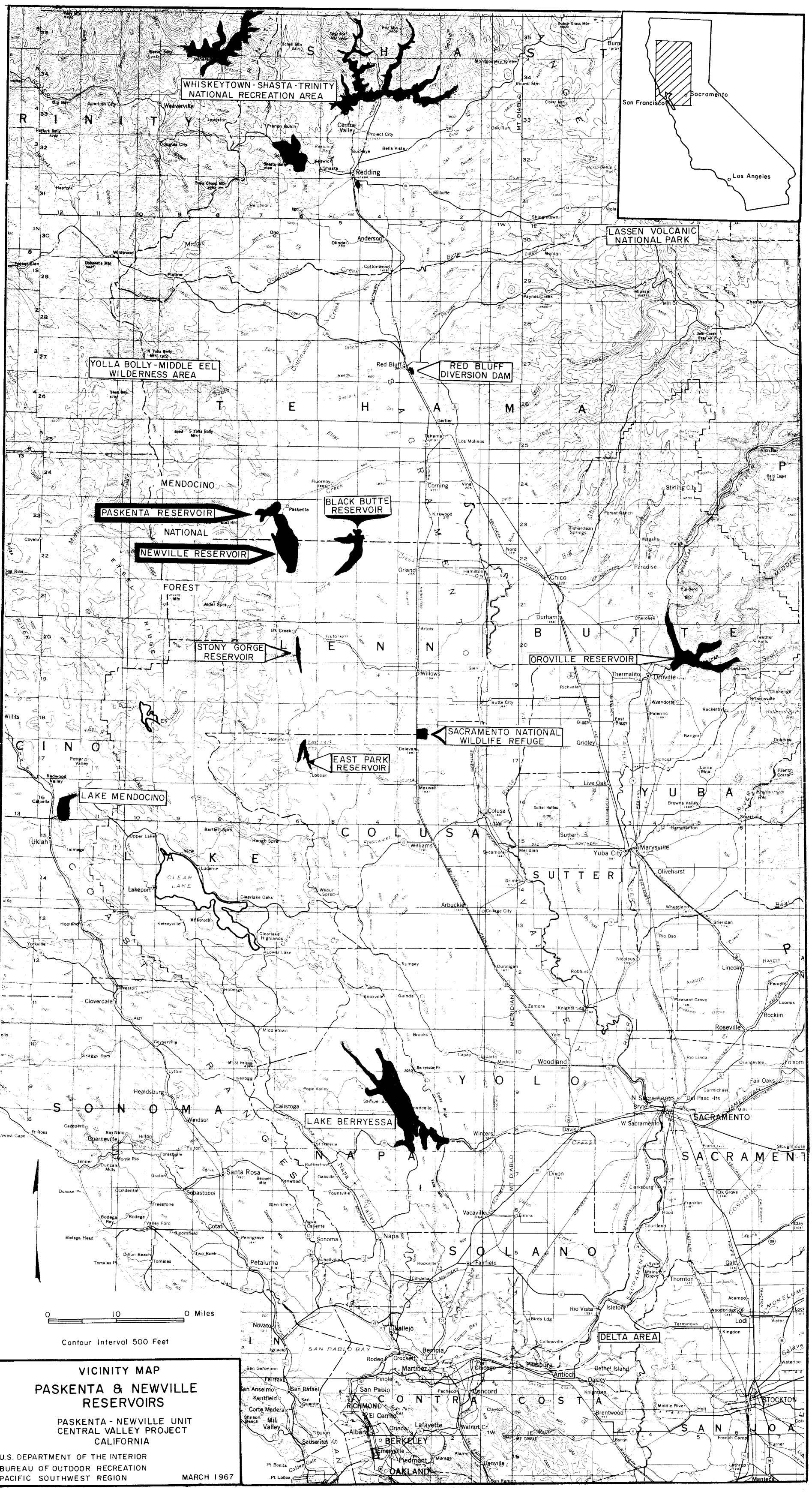
2. That the Forest Service be requested to develop and administer this recreation facility as proposed.

3. That all road construction, clearing operations, and location of borrow pits be coordinated with the administering agency and with the National Park Service.

4. That in the absence of an agreement by the Forest Service or other public agency to develop and administer proposed recreation facilities, provision be made in accordance with Public Law 89-72 to acquire and hold for 10 years the 2,515 acres of private land necessary to protect the recreation potential of the reservoir project.

5. That funds totalling $100,000 be allocated for archeological salvage as recommended by the National Park Service.

APPENDIX



VICINITY MAP

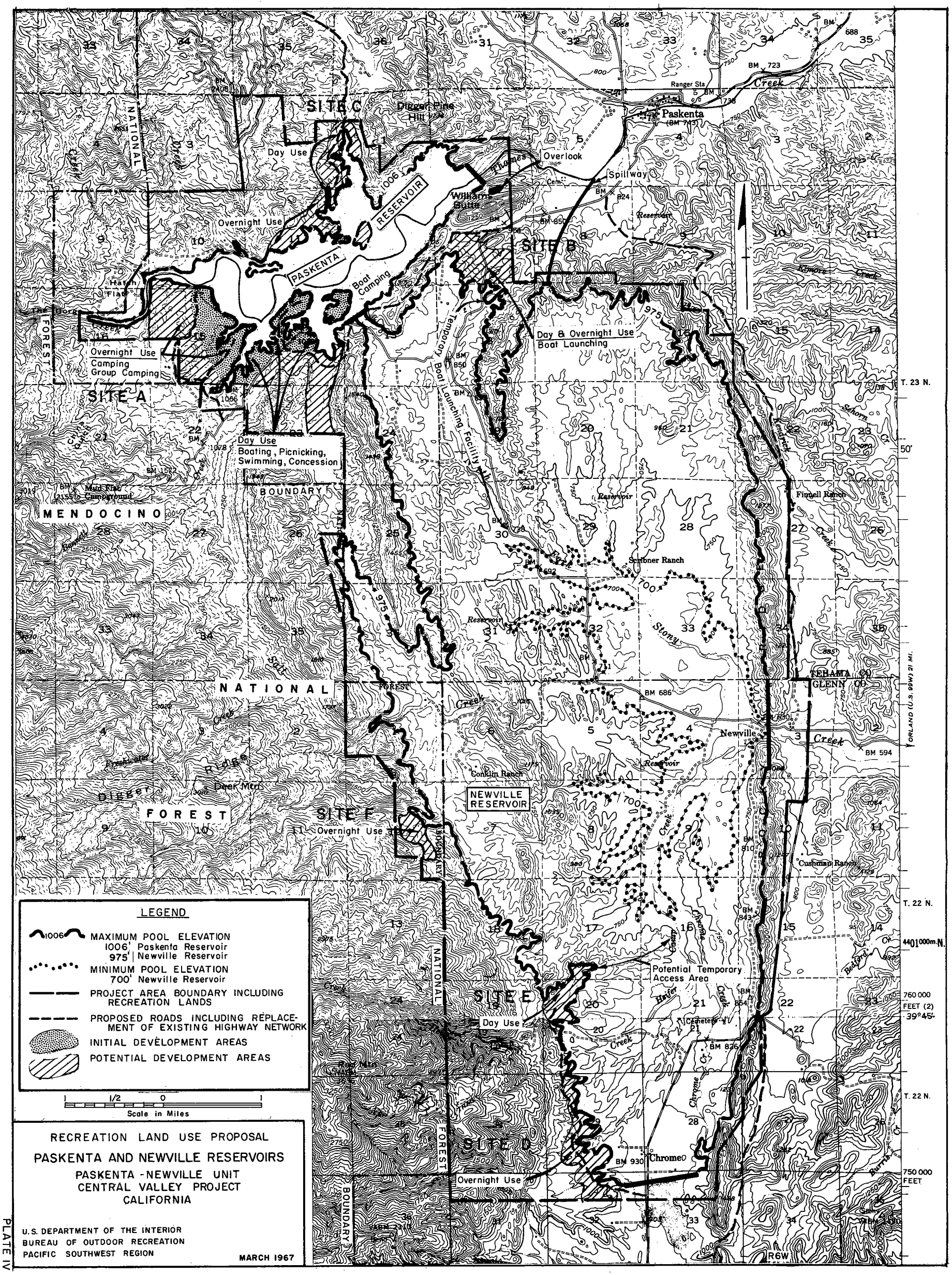
PASKENTA & NEWVILLE RESERVOIRS

PASKENTA - NEWVILLE UNIT
CENTRAL VALLEY PROJECT
CALIFORNIA

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PACIFIC SOUTHWEST REGION

MARCH 1967

PLATE III



LEGEND

- 1006 — MAXIMUM POOL ELEVATION 1006' Paskenta Reservoir
- 975' | Newville Reservoir
- MINIMUM POOL ELEVATION 700' Newville Reservoir
- PROJECT AREA BOUNDARY INCLUDING RECREATION LANDS
- PROPOSED ROADS INCLUDING REPLACEMENT OF EXISTING HIGHWAY NETWORK
- INITIAL DEVELOPMENT AREAS
- POTENTIAL DEVELOPMENT AREAS

1 1/2 0 1
Scale in Miles

RECREATION LAND USE PROPOSAL

PASKENTA AND NEWVILLE RESERVOIRS

PASKENTA - NEWVILLE UNIT
CENTRAL VALLEY PROJECT
CALIFORNIA

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF OUTDOOR RECREATION
PACIFIC SOUTHWEST REGION

MARCH 1967

PLATE IV

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

WATER QUALITY CONTROL STUDY

PASKENTA–NEWVILLE UNIT

Southwest Region

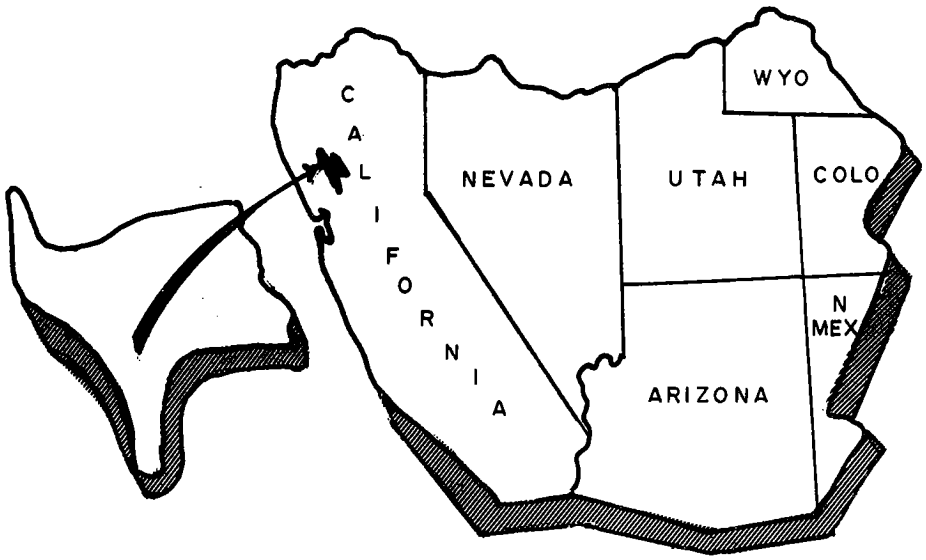
Federal Water Control Administration

Department of the Interior

THOMES AND STONY CREEK BASINS
CALIFORNIA

PASKENTA–NEWVILLE PROJECT

WATER QUALITY CONTROL STUDY



DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHWEST REGION SAN FRANCISCO, CALIFORNIA
MAY, 1967

WATER QUALITY CONTROL STUDY
PASKENTA-NEWVILLE PROJECT
THOMES AND STONY CREEK BASINS
CALIFORNIA

ABSTRACT

A study of the U. S. Bureau of Reclamation's proposed Paskenta-Newville Unit has revealed no need for reservoir storage for the purpose of regulating streamflow for water quality control in the Sacramento River Basin. Water quality detriments of the Paskenta-Newville Project can be mitigated by operation of this and other units of the Central Valley Project to maintain appropriate water quality standards in the Sacramento - San Joaquin Delta.

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHWEST REGION
San Francisco, California

MAY 1967

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I. INTRODUCTION

REQUEST AND AUTHORITY

In a letter dated April 23, 1965 Region 2 of the Bureau of Reclamation requested that the U. S. Public Health Service [a/] "review our general plan (on the Paskenta - Newville Unit) and (furnish) advice as to any problem areas of water quality or pollution control that should be considered." This request was reaffirmed on May 20, 1966 in a letter to the Federal Water Pollution Control Administration. This study has been made in response to these requests and in accordance with provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq.) and Executive Order 11288.

PURPOSE AND SCOPE

The purpose of the study described in this report has been to evaluate 1) the impact of the Paskenta - Newville Unit on water quality; and 2) the need for and the value of storage in the proposed reservoirs for regulation of stream flow for the purpose of water quality control.

Evaluation of the need for water quality control has been limited to those portions of the Thomes and Stony Creek Basins that would benefit by releases from the proposed reservoirs of the Paskenta - Newville Unit of the Central Valley Project.

The time horizon selected for the study is 1970-2070 (100 years). The report is based on existing engineering and economic data and information collected from local, State and Federal agencies.

The Federal Water Pollution Control Administration is currently engaged in the development of a comprehensive water pollution control program for the Central Pacific Basins in which this proposed project is located. Completion of the development of this program will yield additional information that may demand a further evaluation of the conclusions presented in this report.

a/ In accordance with Public Law 89-234, the Federal Water Pollution Control Administration now administers the Federal Water Pollution Control Act, as amended (33 U.S.C. 466 et seq.).

ACKNOWLEDGMENTS

This study was materially aided by the cooperation and assistance of the following Federal and State agencies:

Bureau of Reclamation, Region 2
U. S. Department of the Interior
Sacramento, California

Bureau of Sport Fisheries and Wildlife
U. S. Department of the Interior
Sacramento, California

Bureau of Outdoor Recreation
U. S. Department of the Interior
San Francisco, California

Northern District
Department of Water Resources
State of California
Red Bluff, California

Central Valley Regional Water Quality Control Board
State of California
Sacramento, California

II. SUMMARY OF FINDINGS AND CONCLUSIONS

FINDINGS

1. The proposed Paskenta and Newville Reservoirs will be located on Thomes Creek and the North Fork of Stony Creek, respectively. The watersheds of the reservoirs are located in the California Coast Range of Glenn and Tehama Counties. Proposed uses of these reservoirs include flood control, irrigation, fishery and wildlife recreation and water quality control.

2. Water for development of new irrigable land downstream from the damsites and for export from the Sacramento River Basin to Central and Southern California for agricultural, municipal and industrial purposes will form the main conservation features.

3. Releases from the project will result in the increase of the annual long-term carry-over yield of the Central Valley Project by 383,000 acre-feet. Of this total, 43,000 acre-feet will be available for irrigation within the study area. The remaining 340,000 acre-feet will be available to the Central Valley Project for use outside of the study area.

4. The channels of the two creeks below the existing Black Butte Dam and the proposed Paskenta Dam are relatively wide and porous. During summer months there is essentially no natural flow for extended periods in these lower extremities because of low runoff and high percolation rates in the creek beds.

5. The economy of the area is predominantly agricultural in character. Existing agricultural water supplies are derived from the main stem of Stony Creek, imported Sacramento River water and local ground water supplies. Present municipal and industrial water supplies are derived mainly from ground water.

6. No fishery currently exists immediately below the proposed damsites and neither the U. S. Bureau of Sport Fisheries and Wildlife nor the California Department of Fish and Game plan to develop a fishery in this area. However, a warm water fishery will be developed in the proposed reservoirs. Water will be released from the Tehama-Colusa Canal to lower reaches of Thomes and Stony Creeks for maintenance of a fishery there and in the Sacramento River.

7. Municipal waste disposal is currently accomplished by land application. Conveyance of waste, during the non-irrigation season, to the Sacramento River for dilution and assimilation is practiced by the town of Corning. Present waste disposal practices conform with requirements of local and State regulatory agencies.

CONCLUSIONS

1. The Thomes Creek sub-basin population of 6,300 (1960) will increase to about 59,000 by 2070. The Stony Creek sub-basin population of 8,500 (1960) will increase to about 79,000 by 2070. Growth of light industries combined with expansion in trade and service facilities and agricultural activities is projected to occur.

2. The combined municipal and industrial waste loadings after adequate treatment (85 percent BOD_5 reduction) are estimated to increase from 185 pounds of BOD_5 per day in 1960 to 1,800 pounds per day in 2070 in the Thomes Creek area. In the Stony Creek area, the organic waste loading will increase from 260 pounds per day to 2,400 pounds over the same period.

3. Land application will continue to be the most practical method for disposal of treated municipal and industrial waste effluents. During the non-irrigation season, effluent should be conveyed to the Sacramento River for discharge, except where percolation ponds are feasible.

4. Storage in Paskenta and Newville Reservoirs for stream flow regulation for water quality control in Thomes Creek and Stony Creek will not be needed.

5. The project could have detrimental effects on water quality in the Sacramento - San Joaquin Delta because of local consumptive use of water, the generation of additional wastes, the concentrated effects of reservoir evaporation and loss of basin water by export. Mitigation of these water quality detriments can be achieved by maintaining an adequate outflow from the Delta to San Francisco Bay. It is necessary, therefore, that the Bureau of Reclamation operate the Paskenta-Newville Reservoirs in conjunction with all other units of the Central Valley Project in a manner which will avoid deterioration of water quality in the Delta. Water quality levels to be maintained in the Delta will be established in accordance with the Federal Water Quality Act of 1965. These water quality standards will provide the necessary operating criteria for the Central Valley Project.

6. Observations in existing reservoirs on Stony Creek have shown quality changes during impoundment. These are reflected in algal blooms and thermal, turbidity and chemical stratification. However, these quality changes have not diminished the value of impounded water which has been used primarily for agricultural purposes. In Newville Reservoir, water quality will be affected by evaporation under the long hold-over storage. However, this will be a transient condition, since under the Glenn Complex operation shorter hold-over periods will be experienced. Since both Paskenta and Newville Reservoirs will be used not only to meet local irrigation needs but also ultimately to serve as storage of north coastal water before export into Southern California, multi-level outlets should be considered to permit selective withdrawals of the best quality water at all times.

III. PROJECT DESCRIPTION

Paskenta Dam on Thomes Creek, with a proposed reservoir capacity of 130,000 acre-feet, would develop irrigation water for approximately 10,000 acres of farmland in a service area immediately downstream from the damsite (see Figure 1). The reservoir would have a maximum surface area of 2,000 acres behind a 240-foot earthfill dam. Spills from this reservoir would be diverted over a saddle into Newville Reservoir which would be located in an adjacent watershed at a slightly lower elevation. The Newville Dam would be about 400-feet above the streambed and of earthfill construction. When filled, a reservoir of 2,980,000 acre-feet capacity would provide water to irrigate a relatively small service area - 1500 acres of bench land of Stony Creek between the proposed dam and the existing Black Butte Reservoir - and for export into Central and Southern California. The two reservoirs would also provide flood and water quality control, new fishery and wildlife resources and recreational opportunities.

The operation of the proposed reservoirs in conjunction with other facilities of the Bureau of Reclamation's Central Valley Project (CVP) would increase the annual long-term carry-over yield of the entire CVP by 383,000 acre-feet. About 43,000 acre-feet would be released annually for irrigation use within the study area and the remaining 340,000 acre-feet would be exported from the Sacramento River Basin.

The principal purpose of the large Newville Reservoir would be to provide reserve releases into the Sacramento River during drought conditions. These drought releases, coordinated with basic CVP requirements for water exportation to Central and Southern California, would maintain water quality in the Sacramento - San Joaquin Delta and would sustain operation of existing CVP hydroelectric facilities on the Sacramento River and the Trinity River. Operation studies by the Bureau of Reclamation have indicated that Newville Reservoir would be lowered to minimum pool elevation during drought conditions occurring about once in a hundred years.

The description of the Paskenta - Newville Project would not be complete without reference to the Glenn Reservoir Complex. As proposed under the California Water Plan, this complex, consisting of Paskenta, Newville and Rancheria Reservoirs, would serve as a redistribution center for exported North Coastal waters to Central and Southern California. Newville Reservoir and the adjacent Rancheria Reservoir would be interconnected through a low mountain saddle. The Bureau of Reclamation is determining the feasibility

of the Paskenta - Newville Project without reference to its requirement under the Glenn Reservoir Complex. But under the California State-Federal Inter-Agency Joint Program for the development of North Coastal waters, the proposed reservoirs would ultimately be integrated into the water export plan.

IV. STUDY AREA DESCRIPTION

GEOGRAPHY

The study area (Figure 1) encompasses the drainage basins of Thomes Creek and Stony Creek and is located within Colusa, Glenn and Tehama Counties of Northern California. The Thomes Creek drainage basin is composed of 191 square miles of upland watershed above the proposed Paskenta Dam and some 100 square miles below the damsite, extending to the confluence of Thomes Creek and the Sacramento River near Corning.

The North Fork Stony Creek drainage area includes the watershed above the proposed Newville Dam and the drainage area on the main stem of the Creek flowing to the Sacramento River near Hamilton City. The study area in the entire Stony Creek Basin includes about 780 square miles of watershed, of which only 67 square miles is located on the North Fork above the proposed Newville Dam.

The topography of the two basins is quite similar, being very mountainous and steep in the higher elevations of the California Coast Range. The lower reaches of the basins are generally rolling foothills and sloping plains extending easterly across the western half of the Sacramento Valley until both creeks discharge into the Sacramento River.

The mountain slopes have a moderate cover of pine and rise as high as 8,000 feet in the Thomes Creek Basin. The intermediate elevations support small growths of oak and brush while the lower levels have growths of brush, willow, cottonwood and tules.

Most of the area on the rolling foothill land is covered with grass and is used mainly for dry land farming and livestock grazing. The flat lands near the Sacramento River, where water is readily available for irrigation, are predominantly devoted to field crops and orchards.

PRINCIPAL COMMUNITIES

The principal community in Thomes Creek Basin is Corning, located in the south central section of Tehama County. Several smaller crossroad communities are scattered throughout the area. Paskenta is the most notable of these rural communities. Orland and Hamilton City in northeastern Glenn County are the principal communities in the Stony Creek Basin. The entire area is primarily rural in character, with the principal communities forming the trade and service centers.

CLIMATE

Climate of the area is of typical California two-season type. Mean annual precipitation varies from about 18 inches in the lower elevations to about 60 inches in the upper mountainous reaches. About 87 percent of the normal annual precipitation occurs between November and April. Snow occurs in the upper parts of the basins but does not remain for extended periods. The winters are moderate, although freezing temperatures do occur for short periods, especially in the higher elevations. Summers are typically warm and dry. Mean temperatures are about 63 degrees Fahrenheit annually with a low of about 45 degrees Fahrenheit in January and a high of 80 degrees Fahrenheit during July.

V. WATER RESOURCES OF THE STUDY AREA

SURFACE WATER

Flows of the Westside Sacramento Valley streams are extremely variable. The historical records (1921-1964) of Thomes Creek at Paskenta show an average annual discharge of about 196,000 acre-feet with a minimum of 32,000 acre-feet (1924) and a maximum of 456,000 acre-feet (1950). Daily discharge rates varied from a peak of 29,800 (Dec. 1964) cfs to frequent extended periods of no natural flow during the summer months.

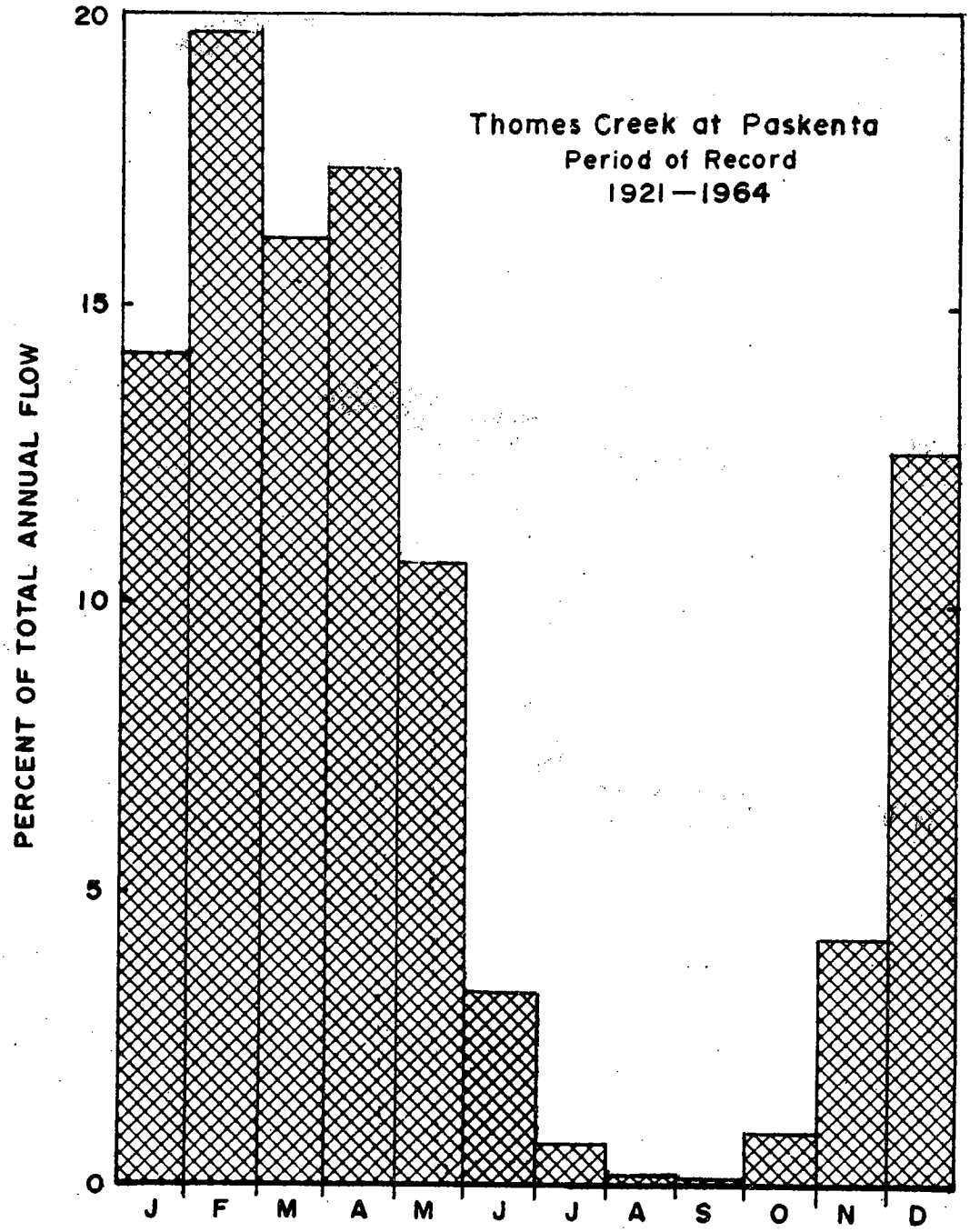
Records from a recently (1963) installed gaging station on the North Fork Stony Creek near the proposed Newville Dam show a total runoff during 1964 of 3,190 acre-feet. No flow conditions existed from June to October. North Fork runoff synthesized over a 45-year period averaged about 26,000 acre-feet annually with a minimum of 3,000 acre-feet in 1964 and a maximum of 60,000 acre-feet in 1938. The monthly distribution of the annual flow of Thomes Creek is shown in Figure 2. A large part of the annual flow occurs during the wet season, December through March. Flow frequencies on the main stems of the two creeks are shown in Figure 3 to indicate the relatively low flows that are characteristic of these creeks during a large part of the year.

GROUND WATER

Ground water in the Thomes Creek area is found in sedimentary deposits between the foothills and the Sacramento River. The source of water is precipitation and surface runoffs which penetrate aquifers immediately adjacent to the creek.

The Bureau of Reclamation estimated that about 15,000 acre-feet is pumped annually near Corning for irrigation. The static water level, located 30 feet below ground surface, has generally been stable in recent periods despite withdrawals. The ground water basin shows no indications of overdevelopment at present pumpage. The estimated total storage capacity of the lower Thomes Creek ground water basin is about 767,000 acre-feet.

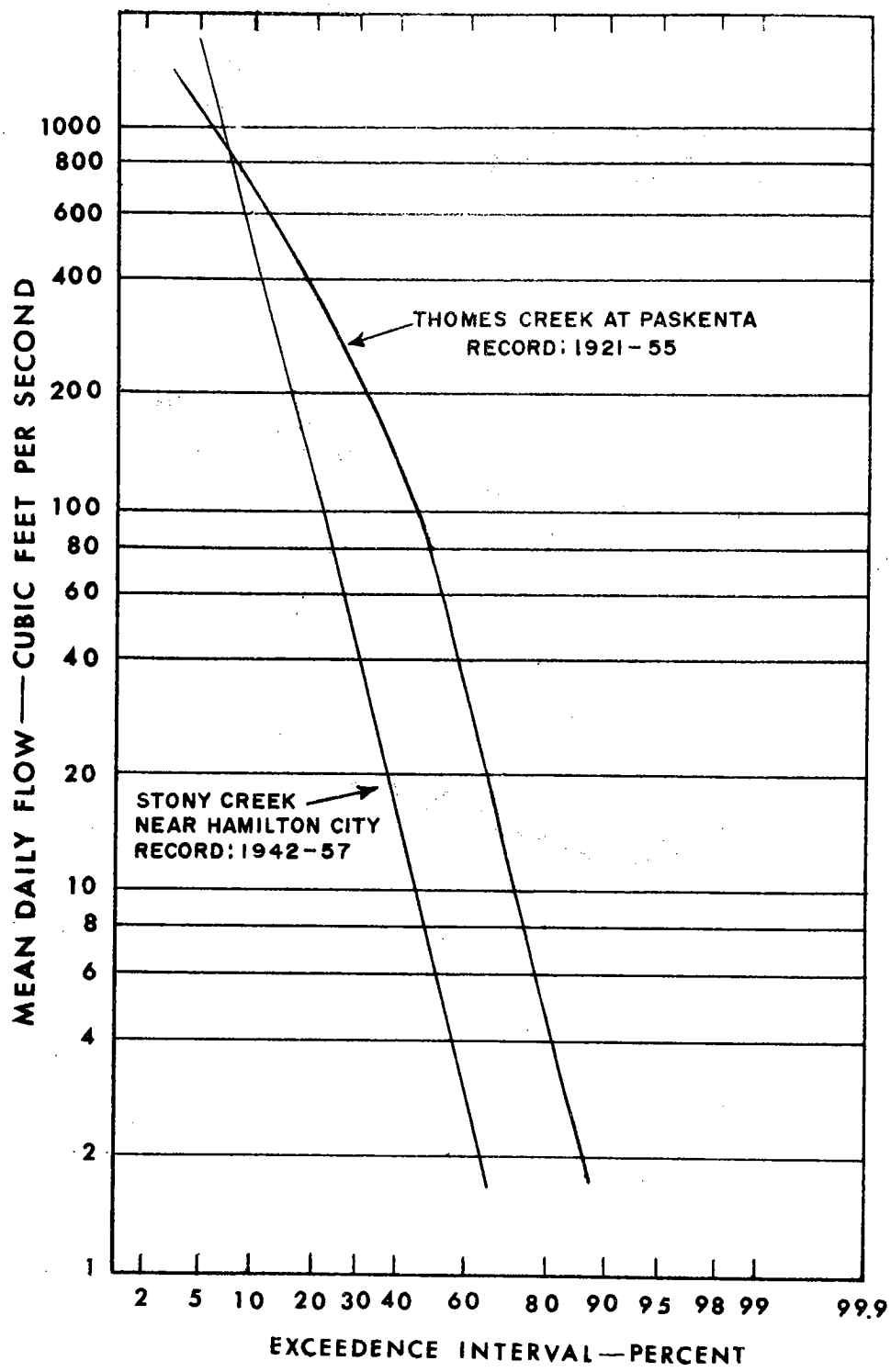
Ground water in the Stony Creek area is also found in the sedimentary deposits of lowlands lying between the foothills and the Sacramento River. The Stony Creek ground water basin is continuous with water in the basin extending southward about 25 miles to the southern border of Glenn County and is not connected with the Thomes Creek ground water basin to the north.



PASKENTA-NEWVILLE PROJECT

MONTHLY DISTRIBUTION
OF ANNUAL FLOW
THOMES CREEK

DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHWEST REGION SAN FRANCISCO, CALIFORNIA



CENTRAL PACIFIC BASINS PROJECT

MEAN DAILY FLOW FREQUENCY

PASKENTA-NEWVILLE UNIT CALIFORNIA

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHWEST REGION SAN FRANCISCO, CALIFORNIA

Irrigation water in a large part of the area is supplied from ground water. The Bureau of Reclamation estimated that about 27,000 acres of farmland are irrigated with ground water.

The entire area in the lower Stony Creek Basin is saturated to within 35 feet of the surface and in some places the water table is close enough to the surface to constitute a serious agricultural drainage problem. The estimated total storage capacity of the entire ground water basin is about 2,912,000 acre-feet. Present ground water developments have not exceeded potential yield of the basin although overdraft conditions exist in some localized areas.

In the upper areas of both basins, ground water is found on bench land adjacent to creeks but yield is limited to small pumpage by isolated communities and rural homes.

QUALITY OF SURFACE AND GROUND WATER

Chemical analyses have been made by the California Department of Water Resources [1] of both Thomes and Stony Creek waters. Table 1 shows the range of constituents found in water samples collected over a three-year period at Thomes Creek near Paskenta and Stony Creek at Black Butte Dam. The waters in both creeks are generally calcium bicarbonate in character and are generally considered excellent in quality for both agricultural and M&I purposes. The maximum dissolved solids and hardness recorded are associated generally with periods of minimum creek flow during the summer months. Stony Creek has generally slightly higher mineral constituents than Thomes Creek which may reflect the more intensive water development and utilization in the Stony Creek basin. The range of chemical constituents shown on Table 1 are within the concentrations recommended by the U. S. Public Health Service Drinking Water Standards of 1962 [2].

Dissolved oxygen samples collected from Thomes Creek at Paskenta showed ranges of 86 to 127 percent saturation over the period of record (1958-61). Analyses of Stony Creek water at Black Butte Dam showed a similar range (87-112%) over the same period. The oxygen deficit samples indicated presence of organic pollutants and/or algal respiration while the saturated samples are the result of algal photosynthetic activity.

According to the U. S. Geological Survey [3], the annual median surface water temperature of Stony Creek and Thomes Creek waters varies from 60-64°F in the uplands to 50-60°F in the lowlands with at least one to 10 days of temperatures greater than 80°F in the higher elevations.

TABLE 1

SURFACE WATER QUALITY
THOMES CREEK AND STONY CREEK [a]

Constituents [b]	Thomes Creek near Paskenta	Stony Creek at Black Butte Dam
Period of Record	Oct. 1958 to Dec. 1961	Jan. 1958 to Dec. 1961
Silica	8.2 - 17	8.9 - 25
Calcium	4.6 - 52	22 - 55
Magnesium	3.0 - 20	6.8 - 24
Sodium	2.1 - 23	7.2 - 42
Potassium	0.3 - 2.0	0.2 - 2.3
Bicarbonate	54 - 188	81 - 229
Carbonate	0.0 - 7.0	0.0 - 5
Sulfate	3.8 - 49	9.0 - 60
Chloride	0.2 - 43	6.0 - 85
Fluoride	0.0 - 0.3	0.0 - 0.4
Nitrate	0.0 - 0.6	0.0 - 3.5
Boron [c]	0.0 - 0.3	0.0 - 0.5
Total Dissolved Solids	63 - 279	114 - 371
Total Hardness (as $CaCO_3$)	52 - 198	84 - 234
Specific Conductance (Micromhos at 25°C)	105 - 469	194 - 634
pH	7.3 - 8.5	7.4 - 8.4
Temperature, °F	87 - 41	79 - 46
Dissolved Oxygen	7.2 - 12.9	7.7 - 11.3
Per Cent Saturation	86 - 127	87 - 112
Turbidity (JCU)	1000 - 1	150 - 1

a/ Data from California Department of Water Resources /1/.

b/ Concentrations expressed in mg/l unless noted otherwise. Range (minimum to maximum) of concentration is shown for the indicated period of record.

c/ Flow weighted TDS of monthly samples in 1960 indicated:

Stony Creek	148.5 mg/l
Thomes Creek	75 mg/l

Daily sediment sampling records on Thomes Creek by U. S. Geological Survey [4] in 1962 show that a total of 906,000 tons were discharged from the 194 square mile watershed, about 30 per cent of which was carried during the month of January. Records of the California Department of Water Resources [1] show turbidity varying from 1 to 1000 (Jackson Candle Unit) in samples collected from 1958-1961. Both the areal sediment load (4600 ton/square mile/year) and the turbidity indicate extensive erosion of the tributary watershed.

Sediment records on Stony Creek are not available but it is known that upland erosion in that basin is not as extensive as in the Thomes Creek Basin. The characteristics of the uplands in the former basin are not as precipitous; moreover, the existing reservoirs trap a high proportion of sediments. Turbidity samples [1] during the period 1958 to 1961 show a range of 1 to 150 (JCU).

Ground water quality in the study area is similar in character to the surface water of both creeks and is considered excellent. Generally, the mineral concentration of ground water in the Stony Creek Basin is higher than in the Thomes Creek area, reflecting greater water development and usage and differences in the geology of the two basins. Total dissolved solids and hardness in Stony Creek are about 50 per cent and 75 per cent higher, respectively, than in Thomes Creek. Chemical constituents of ground water in both basins are within the limits recommended by the U. S. Public Health Service Drinking Water Standards of 1962 [2].

VI. ECONOMY

GENERAL

The past and present economy of both the Thomes Creek and Stony Creek areas is basically agricultural. Livestock in the uplands, dry farming in intermediate elevations and a wide variety of irrigated crops in the lowlands form the typical agricultural pattern for both areas. The predominance of a rural population in the study area is indicated in Table 2.

TABLE 2

POPULATION CHARACTERISTICS
PASKENTA-NEWVILLE STUDY AREA [a/]
1960

	Population	Percent
Rural	8,662	58
Urban	6,200	42
Total	14,862	100

a/ Source: Bureau of Census 1960 [57]

Irrigation field crops such as alfalfa, sugar beets, corn, beans and milo are found in the area near Corning; near Orland, rice is one of the major cash crops. In areas closer to the Sacramento River, specialized orchards such as prunes, olives, walnuts, almonds, peaches, oranges and apricots are grown. In the rolling foothills and highlands, the agriculture is dry-farm oriented, with grain the predominant crop. A large part of this area is used primarily for cattle and sheep grazing. Raising beef cattle is the leading agricultural enterprise but more intensive crop irrigation will occur in the near future with completion of various water projects under construction. Agricultural statistics of the study area in 1959 are shown in Table 3.

TABLE 3

AGRICULTURAL STATISTICS[a/]

PASKENTA-NEWVILLE STUDY AREA
1959

Number of Farms	1,450
Cropland (acres)	125,000
Value of All Crops Sold ($)	11,021,000
Value of All Livestock and Livestock Products Sold ($)	11,600,000
Total Value of All Farm Products Sold ($)	22,621,000

a/ Source: Bureau of Census, Census of Agriculture, 1959, California [6]

In addition to the agricultural activity, the area produces timber for lumber and supplies gravel in considerable quantity for all types of construction work. Natural gas in commercial quantity is found and is becoming an important part of the economy. Other mineral resources of the area include chromite ores which are of commercial grade and were mined until 1958. However, production has decreased in recent years because of the availability of ores from more competitive areas.

Review of employment patterns in Glenn and Tehama Counties has shown that recent growth has been primarily dependent upon food and kindred products, lumber andfurniture, and other miscellaneous manufacturing. Growth was also experienced in construction while agricultural employment showed a slight decline. The present (1960) characteristics of the labor force are shown in Table 4. Future growth will be primarily dependent upon the basic manufacturing industries which in turn will stimulate growth in construction, trade, real estate, hotels and personal services. With the completion of the various water resource projects which are under construction or planned, agricultural activities will intensify. Dry land farms will be converted to growing irrigated crops thereby increasing the cash value of products from the area. However, the growth in cash value of agricultural products is not likely to provide a large increase in agricultural employment. Mechanization will enable greater production per worker thereby lowering the employment growth that would be expected from the changing agricultural pattern.

TABLE 4

LABOR FORCE CHARACTERISTICS a/

PASKENTA-NEWVILLE STUDY AREA
1960

	Labor Force	Percent
Agriculture, Forestry and Fishing	2233	32.5
Mining	73	1.1
Construction	504	7.3
Manufacturing	746	10.8
Service	3312	48.3
Total	6868	100.0

a/ Source: Bureau of Census, 1960 [5]

The recreational opportunities offered by several national forests and by existing and planned reservoirs will attract an increasingly large number of visitors to the area. Excellent fishing and hunting grounds are available in the mountains, foothills, lakes and the irrigated lowlands. Projection of recreational activities in the study area have been made by the Bureau of Outdoor Recreation (BOR) and the Bureau of Sport Fisheries and Wildlife (BSFW). The latter agency has estimated that the Paskenta and Newville Reservoirs would support an average annual use of 24,000 angler-days and 60,000 angler-days, respectively. Hunting efforts for game will average about 11,500 hunter-days for deer and game birds in the uplands and irrigated service areas in the lowlands. The BOR estimated that general recreation in Paskenta and Newville Reservoirs would increase to 667,500 visitor days total by 2025. Service requirements attendant to the expanding recreational activities would stimulate to some degree the general economy of the area.

POPULATION

Projections of populations for the 1970 - 2070 study period are shown in Table 5. The two population centers in the study area are Corning, near Thomes Creek and Orland, near Stony Creek. Projections were made for these two trading and service centers so that future waste loads could be predicted. Future growth rates for the respective Census Divisions

TABLE 5

POPULATION PROJECTIONS
PASKENTA - NEWVILLE STUDY AREA

Year	THOMES CREEK BASIN			STONY CREEK	
	Corning Division	W. Tehama Division	Corning City [a]	Orland Division	Orland City [a]
1960 [b]	5,678	612	3,000	8,572	2,534
1970	7,410	798	4,000	11,180	3,580
2000	18,750	2,020	10,700	28,200	11,000
2020	23,300	3,060	16,700	42,700	18,350
2050	45,500	4,900	28,200	68,700	33,600
2070	53,200	5,730	34,000	79,000	44,800

a/ Corning City population is included in Corning Division Census. Orland City population is included in Orland Division Census.

b/ Source: Bureau of Census 1960 [5].

were projected to reach a maximum of about 3.5 percent per annum in 1980, after which the rates would decline to about 0.9% by 2070.

Populations for the cities of Corning and Orland were projected by using the percentages of the respective Census Division populations currently found in these two service and trading centers. An increase in these percentages was projected through the study period to indicate an expected shift in character of the study area from a rural to an urbanized economy.

The small rural population of farms and crossroad communities form a very small segment of the population in the study areas. Projections of population were not made for these rural areas since they would invite gross inaccuracies and are not expected to follow the pattern of the service and trading centers. Rancheria Reservoir, when completed as part of the California Water Plan, will inundate a number of these small crossroad communities on the main stem of Stony Creek. The only small towns of significance located between the proposed dams and the Sacramento River are Paskenta (1960 population, 100) on Thomes Creek and Hamilton City (1960 population, 700) on Stony Creek. The population of these two small towns will increase but will not be expected to attain the proportion of the two trading and service centers of Corning and Orland. Waste from these latter two centers will form the greatest impact for waste load evaluation purposes.

VII. WATER REQUIREMENTS
MUNICIPAL, INDUSTRIAL AND AGRICULTURAL

PRESENT WATER USES

Municipal and industrial (M&I) water supplies within the study area are derived mainly from ground water. The city of Corning has four wells producing a maximum of about 1 mgd for municipal purposes. The city of Orland is also served by wells producing a maximum of about 0.4 mgd. The total annual ground water withdrawal for M&I uses in these two cities is about 1,500 acre-feet.

Many farms and small crossroad communities are also supplied from well waters. The total annual quantity of water pumped for domestic uses is not known but is estimated to be less than 1000 acre-feet.

Water resources of the Stony Creek Basin had been developed as early as 1910 by the Bureau of Reclamation. The Orland Project provides for the irrigation needs of 17,000 acres of land near Orland. This project includes the Stony Gorge Reservoir (50,000 acre-feet capacity), completed in 1910 and East Park Reservoir (50,000 acre-feet capacity), completed in 1920. About 100,000 acre-feet of Stony Creek water is diverted annually for irrigation use. The Corps of Engineers in 1963 completed Black Butte Dam and Reservoir, primarily for flood control purposes. Under an exchange agreement, signed in 1960 between the Bureau of Reclamation and the Corps of Engineers, flood control storage in Stony Gorge and East Park Reservoirs is exchanged for conservation yield from Black Butte. In addition, Black Butte Reservoir develops a yield of 62,000 acre-feet for irrigation needs of the area. In lower Thomes Creek, the El Camino Irrigation District serves 7,500 acres of land near Tehama mainly from local ground water. Their annual draft on ground storage is about 10,000 acre-feet. The Corning Water District was established to serve about 10,000 acres of land from the Corning Canal, which diverts Sacramento River water near Red Bluff. Although the Canal was completed in 1961, present use has been considerably less than the planned diversion of 25,000 acre-feet/year. The Corning Irrigation Company serves an area of less than 1000 acres mainly by surface diversion from Thomes Creek near Corning. The Glenn-Colusa Irrigation District serves an area near Hamilton City with water diverted from the Sacramento River through the Central Irrigation Canal.

FUTURE WATER USES

Based on data in the study area and from similar communities in the Northern Sacramento Valley, the present per capita use of water in the study area has been determined to be about 150 gpd. This per capita use

includes domestic, municipal, and industrial needs. It is estimated that by 2070, per capita use will increase to 200 gpd due to improved services, amenities and living standards, and development of light industries in the area. The hot dry weather of the Sacramento Valley is conducive to high per capita use. Predicted on projected population estimates, total M & I water requirements by 2070 will be about 12,000 acre-feet/year for the Thomes Creek area, for which 7,200 acre-feet will be needed by Corning. For the Stony Creek area 17,000 acre-feet will be required annually, of which 9,000 acre-feet will be required by 2070 to satisfy the M & I needs of the study area. It is estimated that the existing ground water basin is capable of fulfilling this requirement, thereby eliminating the need for storage of M & I water supply in the proposed reservoirs.

In the areas upstream from the proposed reservoirs, recreational requirements of water for sanitation will require about 1,500 acre-feet/year by 2070. This requirement will be provided by withdrawal from streams or wells located near streams.

Future agricultural water use in the area is closely associated with the Paskenta - Newville Unit and the Tehama-Colusa Canal. As noted previously, the adjacent project service area will be only 11,900 acres and will use less than 43,000 acre-feet annually from the Project. The Tehama-Colusa Canal, authorized as part of the Sacramento River Division of the Central Valley Project, is presently under construction and is scheduled for completion in 1970. Sacramento River water will be diverted near Red Bluff for irrigation needs in service areas along 114 miles of this canal southward in a route roughly parallel to the river. In addition to this primary purpose, about four miles of the Canal will be operated as spawning grounds for chinook salmon, replacing grounds inundated by the Red Bluff Diversion Dam. Contingent with the dual functions of the canal, releases will be maintained for the fishery in the lower 2.7 miles of Thomes Creek and the lower 11 miles of Stony Creek. Firm minimum flows in Thomes Creek between the canal and the Sacramento River will be 50 cfs in the summer and 250 cfs during the October-December salmon spawning season. Releases into Stony Creek for the fishery will range seasonally from a maximum of 500 cfs to a minimum of 100 cfs. These firm releases are necessary since historical flow records indicate that these creeks have essentially no natural flows during a large part of the summer.

VIII. WATER QUALITY CONTROL NEEDS

PROJECTED WASTE QUANTITIES

Presently, municipal and industrial wastes are not discharged to surface waters of either Thomes or Stony Creek. Corning provides secondary treatment for municipal wastes before application to agricultural land during the irrigation season. During the non-irrigation season, treated waste effluent from Corning is discharged through an outfall into the Sacramento River, coinciding with the high runoff. Orland treats municipal sewage in about eight acres of lagoons which could be expanded to 80 acres as needed for increasing population. As the geological formation of the area is composed of an upper sedimentary deposit of sands, silts and small gravels with an inherently high percolation rate, the entire waste flow to these lagoons is lost through percolation assisted by natural evaporation. The bottoms of inlet lagoons were sealed with clay to permit retention of waste water to maintain operable depth, but the secondary lagoons were not sealed to permit percolation of effluent into the ground water basin.

The towns of Paskenta and Hamilton City presently are served by septic tanks and sub-surface tile fields. Hamilton City has plans to construct lagoons similar to those at Orland for disposal by evaporation and percolation. Most small crossroad communities and isolated farm houses are served by septic tanks followed by percolation pits or tile fields. Waste flows and loads were not projected for these small communities as their collective impact is not considered significant. Projections of waste flows and loads for the study area and the population centers of Corning and Orland are shown on Table 6. A treatment efficiency of 85 percent removal of organic constituents by secondary treatment was selected for the study period. Uncontrolled organic loads from natural runoffs would limit the selection of higher treatment efficiencies.

WATER QUALITY REQUIREMENTS

Water from Thomes Creek and Stony Creek is used primarily for irrigation since municipal water is not diverted from these creeks, although minor domestic household water is withdrawn at isolated rural areas. Stock watering in the creeks is a common practice and gravel mining in creek beds also employ water in washing operations.

The Bureau of Sport Fisheries and Wildlife has studied the regions of the two creeks between the Tehama-Colusa Canal and the respective damsites

TABLE 6

PROJECTED WASTE LOADS
PASKENTA - NEWVILLE STUDY AREA

Year	Thomes Creek Basin a/		Corning City		Stony Creek Basin b/		Orland City	
	Flow mgd	BOD_5 #/Day	Flow mgd	BOD_5 #/Day	Flow mgd	BOD_5 #/Day	Flow mgd	BOD_5 #/Day
1960	0.50	186	0.24	90	0.69	257	0.23	76
1970	0.74	246	0.36	120	1.0	335	0.32	107
2000	2.5	623	1.3	321	3.4	846	1.3	330
2050	7.6	1,512	4.2	846	10.3	2,061	5.0	1,008
2070	8.8	1,768	5.1	1,020	11.8	2,370	6.3	1,245

a/ Thomes Creek Basin waste load includes Corning City

b/ Stony Creek Basin waste load includes Orland City

and has concluded that a fishery does not exist nor is development feasible. Therefore, they have no plans to develop a fishery in these locations. However, a warm-water fishery will be developed within the proposed Paskenta and Newville Reservoirs and a cold-water fishery will be developed in the Tehama-Colusa Canal and in the lower reaches of Thomes and Stony Creek, between the canal and the Sacramento River.

The Central Valley Regional Water Quality Control Board (RWQCB) has established effluent discharge requirements for Stony Creek. Pertinent sections of Resolution No. 67-6, which was established on September 23, 1966 for the Stony Gorge Resort Improvement District near Stony Creek is shown in Appendix A. The District discharges treated waste effluent for land disposal but the requirements were established for the maintenance of stream quality since it was recognized that land applied effluent could reach Stony Creek during the high runoff season. Thus, the RWQCB and County and State Public Health Officials will probably require land disposal of effluents from future municipal development. In the lower reaches of the study area, discharge of treated effluent into the Sacramento River during the non-irrigation season may be permitted. To protect the quality of nearby surface waters, wastes disposal on land should receive secondary treatment and disinfection.

PRESENT FLOW REGULATION NEEDS

Under present conditions, all wastes within the study area are either applied on land for evaporation and percolation or used consumptively for agricultural irrigation. During the wet season when irrigation needs are minimal, Corning discharges effluent to the Sacramento River. Local and State agencies are satisfied with present practices. The need for flow regulation in Thomes Creek or Stony Creek under present disposal practices does not exist.

FUTURE FLOW REGULATION NEEDS

The development of the dilution and assimilation capacity of both Thomes and Stony Creeks has been considered as an alternate solution to the waste disposal problems of the study area. However, several conditions must be met for this development. The channel should be capable of transporting diluted waste at a suitable velocity to prevent sedimentation and sludge

deposition. This channel should be so maintained not only to contain waste water but also permit beneficial in-place and withdrawal uses from creeks. The existing creeks are too wide to carry waste water flows effectively. The creek beds are very porous and flow maintenance may be difficult during low flow periods. Study of the historical natural flows in these creeks reveals that no-flow conditions exist during a large part of the summer. Supplementary water quality control flows could be obtained by pumping from local ground waters. This would eliminate the need for flow regulation releases from the reservoirs, but would place an additional demand on the ground water basin, incur pumping costs and would require suitable devices to inject dissolved oxygen to the ground water released for this purpose. Development of Thomes and Stony Creeks for dilution and assimilative capacity for waste disposal by flow regulation is not considered feasible.

Land application will continue to be the most important method for the disposal of treated effluent. The study area is underlain with natural sedimentary deposits which have inherently high percolation rates. Furthermore, the environment of the area during the hot and dry summer months is conducive to high evaporative effects. If necessary, limited discharge as practiced by Corning would be permitted to the Sacramento River during the wet season, when high runoffs are available for dilution and assimilation. Orland can be expected to utilize land disposal methods in all seasons.

Based on information presently available, it is concluded that there is no need for providing storage in either Paskenta or Newville Reservoir for the purpose of flow regulation for quality control in Thomes Creek or Stony Creek.

IX. EFFECTS OF PROJECT ON WATER QUALITY

EFFECTS OF STORAGE IMPOUNDMENT

Chemical quality of water stored in the proposed reservoirs will deteriorate to some degree from natural causes. Potential problems resulting from natural, physical, chemical, geological and biological factors could be significant since operational studies of Newville Reservoir have indicated that long fill-up and hold-over storage time would be normally scheduled. The long hold-over time could cause quality changes which would not be apparent in normally operated reservoirs with shorter detention times.

To evaluate possible effects of the long hold-over storage, operational analyses of Newville Reservoir were made with respect to total dissolved solids (TDS) concentrations. These analyses indicated the TDS concentration of Newville Reservoir water would increase from an initial 75 mg/l to a maximum of 139 mg/l during a 14-year period of operation equivalent to the historical drought (1920-1934) recorded in the study area.

Despite the significant evaporative effect, the total dissolved solids remain well below the upper limit established by the U. S. Public Health Service Drinking Water Standards of 1962 [2] of 500 mg/l and do not diminish the value of these waters for irrigation use.

Increase in dissolved minerals could also be anticipated due to increased time of contact with natural geological deposits and suspended sediments within the reservoir area. Gunnerson and Morris [7] reported increases in solids concentration as high as 18 per cent from solution of suspended sediments in water. Iron, manganese and chromium contents could increase by the long contact time during hold-over in Newville Reservoir. Iron ore is a natural constituent of most geological formations and is present in the reservoir sites; manganese and chromite ores are found in commercial grade in the study area.

The nutrient materials, nitrogen and phosphorus, would also be concentrated by reservoir evaporation to levels that could induce excessive algal blooms. Table 7 presents plankton populations in samples collected by the California Department of Water Resources in three existing reservoirs located on Stony Creek. These findings indicate prolific growth conditions that are generally referred to as "blooms". The oxygen content of water could fluctuate from supersaturation induced by algal photosynthetic activity to nearly complete depletion in the deeper waters caused by nocturnal algal respiration or exertion of an organic demand by dead algal masses. Since the existing reservoirs have relatively short hold-over periods, compared to the proposed Newville Reservoir, it can be expected that the proposed Newville Reservoir will experience similar or worse conditions.

TABLE 7

PLANKTON COUNT [a/]
STONY CREEK RESERVOIRS

Reservoir Location	East Park	Stony Gorge	Black Butte
Date Collected	13 Sept. 1966	18 July 1966	8 Aug. 1966
Algae (counts/ml)			
Blue Green	3,750	10,350	2,185
Green	710	470	720
Diatoms	2,200	240	2,360
Total Algae	6,660	11,000	4,265
Blue Green (as % of total)	56	93	51
Protozoa (counts/ml)	7,720	2,130	860
Total (counts/ml)	14,380	13,190	5,125

a/ Source: Office Files, California Department of Water Resources, Red Bluff, California, 1966.