

Alternatives

ALTERNATIVES

INTRODUCTION

The “Alternatives” section describes several future development scenarios for the Bullfrog, Halls Crossing, and Hite developed areas. These alternatives were developed to consider a range of management actions for the uplake areas that would address changes in visitation numbers, visitor expectations, and evaluate facilities and operations as lake levels fluctuate due to drought.

Alternative A (the no-action alternative) describes a management action that would continue the present level of facilities and operations to maintain the status quo. The no-action alternative provides a basis for comparing changes in management actions and evaluating the consequences for each alternative. Should the no-action alternative be selected, the National Park Service would continue to manage the facilities and operations as they currently exist, with the exception of construction projects that are actively in progress that were based on decisions approved in previous planning.

Alternatives B and C consider a range of options and changes to the existing facilities and services at Bullfrog, Halls Crossing, and Hite. Alternative B proposes changes to current facilities through upgrades and defined maximum expansion of specific facilities to address future needs. Alternative C includes many of the same proposals described in alternative B with additionally specific improvements or facility expansion.

Table 1 provides a snapshot of most of the components or actions in the alternatives. The river runner takeout and uplake airstrips are described in the no-action alternative narrative following the tables. All other components have expanded descriptions after the tables for further explanation of existing conditions and proposed changes.

Six project objectives are defined under the purpose and need for this project. Table 5 evaluates all three of the project alternatives against these six objectives, providing a rationale for whether each meets, partially meets, or does not meet the objectives. Alternatives B and C have both been determined to meet all six project objectives. Alternative B is the environmentally preferred alternative, as it best meets the six NEPA criteria as illustrated in table 6. Because alternative B meets all six project objectives and is the environmentally preferred alternative, it has been identified as the NPS preferred alternative (and is the proposed action for section 106 compliance). The preferred alternative defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors. All actions described in the preferred alternative are consistent with the approved 1979 GMP and related recreation area documents.

TABLE 1. SUMMARY OF ALTERNATIVES

Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Employee, Concessioner, Partner Housing	<p>Maintain employee, concessioner, and partner housing at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: 25 NPS units, 173 concessioner units, 8 partner units, 11 concessioner recreational vehicle (RV) sites - Halls Crossing: 8 NPS units, 42 concessioner units - Hite: 6 NPS units, 10 concessioner units, 3 employee RV sites 	<p>Upgrade employee, concessioner, and partner housing at Bullfrog, Halls Crossing, and Hite. Provide housing for temporary employees through RV spaces. Improve support facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Increase up to 4 NPS units (29 total), up to 6 partner units (14 total), up to 24 concessioner units (197 total), up to 13 RV sites (24 total) - Halls Crossing: Increase up to 2 NPS units (10 total), up to 4 concessioner units (46 total), up to 12 RV sites - Hite: No change in numbers 	Same as alternative B
Visitor Overnight Accommodations	<p>Maintain lodge at Bullfrog and family rental units at all uplake developed areas.</p> <ul style="list-style-type: none"> - Bullfrog: 48-room lodge, 8 family rental units - Halls Crossing: 20 family rental units - Hite: 5 family rental units 	<p>Upgrade and increase inventory of lodge and family rental units.</p> <ul style="list-style-type: none"> - Bullfrog: increase up to 94 visitor accommodation units (150 total) - Halls Crossing: Increase up to 40 family rental units (60 total) - Hite: Increase up to 15 family rental units (20 total) 	Same as alternative B
Visitor Camping	<p>Maintain existing visitor camping at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: 24 RV sites, 78 developed campsites, approximately 88 sites at overflow campground, primitive camping at North and South Bullfrog and Stanton Creek - Halls Crossing: 64 developed campsites, 32 RV sites - Hite: Approximately 25 sites at primitive campground loop, primitive camping along shoreline of the Colorado and Dirty Devil rivers and Farley Canyon on the lake 	<p>Increase number of sites and upgrade developed campgrounds. Improve support facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Increase up to 128 sites (total of 230), consolidate RV and campground in campground location, add support facilities - Halls Crossing: Increase up to 8 RV sites (40 total) - Hite: Convert 25 primitive sites to developed sites, primitive camping along shoreline of the Colorado and Dirty Devil rivers, and Farley Canyon on the lake 	<ul style="list-style-type: none"> - Bullfrog: Same as alternative B - Halls Crossing: Consolidate Halls Crossing RV and campground sites at campground location, add campground amphitheater - Hite: Same as alternative B

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Shower and Laundry Facilities	<p>Maintain existing shower and laundry facilities at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Combined visitor and employee facility available - Halls Crossing: Combined visitor and employee facility available, shower facilities for visitor use, laundromat for employees - Hite: No facilities 	<p>Upgrade shower and laundry facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Relocate shower and laundry facilities - Halls Crossing: Relocate all visitor shower and laundry facilities to Village Center - Hite: Add combined visitor and employee shower and laundry facility 	<ul style="list-style-type: none"> - Bullfrog: Same as alternative B - Halls Crossing: Relocate all visitor shower and laundry facilities to campground - Hite: Same as alternative B
Land-Based Stores	<p>Maintain existing land-based stores at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Village Center store with snack food, sundries, fuel, and automotive repair - Halls Crossing: Village Center store with snack food, sundries, fuel - Hite: Store with snack food, sundries, fuel, and RV waste disposal station 	<p>Upgrade store facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Upgrade Village Center store, add campground store - Halls Crossing: Upgrade Village Center store - Hite: Upgrade store 	Same as alternative B
Land-Based Food Service	<p>Maintain existing land-based food service at Bullfrog.</p> <ul style="list-style-type: none"> - Bullfrog: 180-seat restaurant - Halls Crossing: No land-based food service - Hite: No land-based food service 	<p>Expand and upgrade land-based food service.</p> <ul style="list-style-type: none"> - Bullfrog: Increase seating up to 70 (250 total), add second land-based food service facility - Halls Crossing: Add land-based food service - Hite: Add land-based food service at store 	Same as alternative B
Day-Use Facilities (picnic areas, restrooms, and shade shelters not designed for overnight camping)	<p>Maintain existing day-use facilities at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Day-use facilities located at boat ready area - Halls Crossing: Day-use facilities adjacent to marina, parking area with picnic facilities near ferry access road - Hite: No day-use facilities 	<p>Add additional day-use facilities at Halls Crossing and add new facilities to Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Same as alternative A - Halls Crossing: Add second day-use area - Hite: Add day-use facility, develop partnership with Utah Department of Transportation (UDOT) for upgrades to State Highway (SH) 95 overlook 	Same as alternative B

TABLE 1. SUMMARY OF ALTERNATIVES

Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Ranger Station / Visitor Contact Station and Emergency Facilities	<p>Maintain existing ranger / visitor contact station and emergency facilities at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Visitor contact / ranger station / medical clinic, emergency support equipment, and fire station - Halls Crossing: Floating visitor contact / ranger station and first-aid station, temporary helipad, emergency support equipment - Hite: Visitor contact / ranger station, first-aid station, emergency support equipment 	<p>Maintain existing facilities with minimal upgrades.</p> <ul style="list-style-type: none"> - Bullfrog: Same as alternative A - Halls Crossing: Same as alternative A with upgrade to existing helipad - Hite: Same as alternative A 	<ul style="list-style-type: none"> - Bullfrog: Same as alternative B - Halls Crossing: Upgrade existing floating ranger / visitor contact station and emergency facilities and add a land-based visitor / ranger contact station, combine land-based facility with emergency facilities building - Hite: Same as alternative B
Concessioner Boat Maintenance and Repair and Property Maintenance Facilities	<p>Maintain existing boat maintenance / repair and property maintenance facilities at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Boat maintenance and repair, warehouse, indoor and outdoor storage, boat wash down, concessioner administration - Halls Crossing: Automotive repair, boat maintenance and repair, warehouse, indoor and outdoor storage, floating boat repair facility - Hite: Boat maintenance and repair, warehouse, indoor and outdoor storage 	<p>Relocate and upgrade boat maintenance / repair and property maintenance facilities at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Relocate boat maintenance and repair and concessioner property maintenance facilities - Halls Crossing: Relocate boat maintenance and repair and concessioner property maintenance facilities - Hite: Same as alternative A 	<p>Same as alternative B</p>
Park Service Maintenance Facilities	<p>Maintain existing NPS maintenance facilities at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Warehouse building, indoor and outdoor storage - Halls Crossing: Warehouse building, indoor and outdoor storage - Hite: Warehouse building, indoor and outdoor storage 	<p>Same as alternative A</p>	<ul style="list-style-type: none"> - Bullfrog: Relocate maintenance facilities - Halls Crossing: Same as alternative A - Hite: Same as alternative A

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Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Secured Storage	<p>Maintain existing secured storage location and size at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: up to 750 outdoor spaces - Halls Crossing: up to 230 outdoor spaces - Hite: up to 107 outdoor spaces 	<p>Upgrade secured storage at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Expand up to 250 spaces (total of 1000), add enclosed facility - Halls Crossing: Relocate secured storage and expand up to 170 spaces (total of 500), add enclosed facility - Hite: Expand up to 53 spaces (total of 160) 	Same as alternative B
Utility Systems	<p>Maintain existing utility systems at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: 3 diesel electrical generators and distribution system, 3 water wells and 2 storage tanks with distribution system, water collection and treatment system, propane storage tanks with distribution tanks - Halls Crossing: 3 diesel electric generators with distribution system, 2 water wells and storage tank with distribution system, water treatment and collection system, propane storage tank with distribution system - Hite: 1 diesel generator with distribution system, 1 water well and lake intake system with distribution, water treatment and collection system, propane storage tank with distribution system 	<p>Expand utility systems as needed to meet code and demands of new development, supplement power systems with solar, fuel-cell, or alternative power technology, as appropriate.</p> <ul style="list-style-type: none"> - Bullfrog: Expand as needed - Halls Crossing: Expand as needed - Hite: Expand as needed, replace aboveground water storage tank with below-ground water storage tank 	Same as alternative B
Roads and Parking	<p>Maintain existing access and parking areas at Bullfrog, Halls Crossing, and Hite.</p>	<p>Improve/add roads and parking areas at Bullfrog, Halls Crossing, and Hite as needed to accommodate added or relocated facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Same as alternative A - Halls Crossing: Improved road to relocated secured storage / property maintenance area - Hite: Unimproved road to primitive shoreline camping 	Same as alternative B

TABLE 1. SUMMARY OF ALTERNATIVES

Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Fee Collection	<p>Maintain existing fee collection at Bullfrog, Halls Crossing, and Hite.</p> <ul style="list-style-type: none"> - Bullfrog: Fee collection booths, automated fee collection station - Halls Crossing: Fee collection booth, automated fee collection station - Hite: Automated fee collection station 	<ul style="list-style-type: none"> - Bullfrog: Upgrade fee collection booths for accessibility and administrative services - Halls Crossing: Same as alternative A - Hite: Same as alternative A 	Same as alternative B
School	Maintain existing school at Bullfrog.	Upgrade school at Bullfrog to include library building.	Same as alternative B
Boat Wash-Down Area	<p>Maintain existing boat wash-down areas.</p> <ul style="list-style-type: none"> - Bullfrog: Concessioner boat wash-down area, no public access - Halls Crossing: Concessioner boat wash-down area, no public access - Hite: No boat wash-down area 	<p>Upgrade and expand boat wash-down areas.</p> <ul style="list-style-type: none"> - Bullfrog: Add public boat wash-down area - Halls Crossing: Add public boat wash-down area - Hite: Add public boat wash-down area 	Same as alternative B
Marina Facilities	<p>Maintain existing marina facilities at Bullfrog, Halls Crossing, and Hite. Total combined uplake wet moorage up to 1,090 spaces. Total existing rental fleet of 173 boats (runabout/houseboat/personal watercraft).</p> <ul style="list-style-type: none"> - Bullfrog: Wet moorage (slips and buoys) of 672 spaces for rental operations, overnight and courtesy slips, and executive services, slips for concessioner operations, 134 rental boats - Halls Crossing: Wet moorage (slips and buoys) of 418 for rental operations, overnight and courtesy slips, and slips for concessioner operations, 3 rental boats - Hite: Above lake elevation 3,620, courtesy docks, below 3,620, no water-based facilities available at Hite 	<p>Expand existing marina facilities at Bullfrog and Halls Crossing. Increase combined uplake wet moorage up to 1,145 spaces, including 16 existing NPS slips. Increase rental boat fleet up to 580 boats (combined runabout/houseboat/personal watercraft).</p> <p>Distribution of wet moorage/fleet to be managed between Bullfrog and Halls Crossing as needed for management flexibility and lake level changes.</p> <ul style="list-style-type: none"> - Bullfrog/Halls Crossing: Add up to 55 buoys - Bullfrog/Halls Crossing: Add up to 407 rental boats - Halls Crossing: Add a fishing dock - Hite: Same as alternative A 	<p>Expand existing marina facilities at Bullfrog and Halls Crossing. Increase combined uplake wet moorage up to 1,201 spaces, including 16 existing NPS slips. Increase rental boat fleet up to 580 boats (combined runabout/houseboat/personal watercraft).</p> <p>Distribution of wet moorage/fleet to be managed between Bullfrog and Halls Crossing as needed for management flexibility and lake level changes.</p> <ul style="list-style-type: none"> - Bullfrog/Halls Crossing: Add up to 55 buoys and 56 slips - Halls Crossing: Same as alternative B - Hite: Same as alternative A

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Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Water-Based Food Service	<p>Maintain existing water-based food service.</p> <ul style="list-style-type: none"> - Bullfrog: No water-based food service available - Halls Crossing: Snack bar - Hite: No water-based food service available 	<p>Upgrade/expand water-based food services at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Add water-based food service facility - Halls Crossing: Add water-based food service facility - Hite: No water-based food service 	Same as alternative B
Launch Ramps	<p>Maintain existing launch ramp facilities. (elevations in feet amsl, typ.)</p> <ul style="list-style-type: none"> - Bullfrog: Main ramp: (paved) 150-foot-wide ramp from 3,700 to 3,605, 80-foot-wide ramp from 3,605 to 3,580, and 50-foot-wide old road surface from 3,580 - North ramp: (paved) 50-foot-wide section from 3,580 to 3,557 - Halls Crossing: (paved) 110-foot-wide section from 3,700 to 3,550 - Hite: (paved) 110-foot-wide section from 3,700 to 3,640, and (unpaved) 30-foot-wide section from 3,640 to 3,620; below 3,620 unimproved gravel/dirt route to Colorado River shoreline. 	<p>Extend launch ramps to access lower lake levels at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Extend 80-foot width at main ramp to access lower lake levels as needed until topography limits are exceeded - Halls Crossing: same as alternative A: allow unimproved ramp launching "at own risk" until topography limits are exceeded - Bullfrog/Halls Crossing: Add launch ramps and access road when main ramps no longer function, potential expansion areas along shoreline toward main channel (where shown on alternatives maps) - Hite: Same as alternative A 	<p>Extend or add launch ramps to access lower lake levels at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Extend 110-foot width at main ramp to access lower lake levels as needed until topography limits exceeded - Halls Crossing: Same as alternative B - Hite: Same as alternative A
Launch Ramp Support	<p>Maintain existing launch ramp support facilities.</p> <ul style="list-style-type: none"> - Bullfrog: Parking, boat ready area, restrooms, fish cleaning station, staging lane, trash disposal, waste disposal station, shade shelters, weather station, and information kiosk - Halls Crossing: Parking, restrooms, fish cleaning station - Hite: Parking, restrooms, fish cleaning station, porta-potty waste disposal, shade shelter 	Same as alternative A	<ul style="list-style-type: none"> - Bullfrog: Same as alternative A - Halls Crossing: Same as alternative A - Hite: Expand to include land-based pump-out facilities

TABLE 1. SUMMARY OF ALTERNATIVES

Designation	Alternative A : No-Action Alternative	Alternative B: Preferred Alternative	Alternative C
Ferry Service	<p>Maintain existing ferry service/ramps at Bullfrog and Halls Crossing as long as ferry operates (elevations in feet amsl, typ.).</p> <ul style="list-style-type: none"> - Bullfrog: Main ferry service/ramp from 3,700 to 3,600, temporary ramp area service below 3,600 - Halls Crossing: Main ferry service/ramp from 3,700 to 3,580, use main launch ramp from 3,580 to 3,550 	<p>Extend or add ferry service/ramps to access lower lake levels at Bullfrog and Halls Crossing.</p> <ul style="list-style-type: none"> - Bullfrog: Same as alternative A, adjust docking wedge to accommodate lower lake levels - Halls Crossing: Add ferry service/ramp and access when main ramps no longer function below 3,550, combine with main ramp development along shoreline toward main channel (where shown) 	Same as alternative B

This section includes a discussion of other alternatives considered and dismissed from detailed analysis, a summary table comparing the alternatives to planning objectives, possible mitigation measures for various alternatives, a summary table comparing the environmental consequences of each alternative, and an explanation of the application of the updated analysis for Lake Powell carrying capacity issues considered in this DCP/EA.

DISTURBED AREA CALCULATIONS

Table 2 outlines the estimated acreage for new development by alternative. Acreage of existing development was calculated using aerial photos. In cases where new development is anticipated (such as an increase in the number of housing units) the acreage of the existing facilities were used to calculate an approximate size for expansion. Site-specific design will guide actual sizes as the final plan is implemented.

In some cases, facilities that may be moved or eliminated from an existing site will show a portion of the land as restored (reclaimed and revegetated). The total development acreage reflects that reduction in disturbed area. In a few plan components development is to be relocated and new structures are proposed in that previously disturbed area. This condition is shown as zero additional disturbance.

Restored acreage in most cases would be reclaimed with native landscaping or revegetated with native seed mixtures from the approved plant materials specific to this park unit.

ALTERNATIVE A (NO ACTION)

The no-action alternative would allow the continuation of current uses. The no-action alternative describes the existing condition of developed areas at Bullfrog, Halls Crossing, and Hite. Future actions that are currently funded or with a reasonable potential for future funding from the approved DCPs and amendments or other approved directives or construction activities could take place under the no-action alternative. However, the no-action alternative does not include these possible future developments as part of the existing condition. Alternative A does not include operational activities and construction needed to accommodate water levels below 3,550 feet in elevation. These activities would continue to be reviewed on an individual basis, including preparation of the appropriate environmental compliance documents. Elements of the no-action alternative are included on figures 5, 6, and 7 for Bullfrog, Halls Crossing, and Hite, respectively. Table 1 contains a synopsis of the no-action alternative with complete descriptions in the following discussion.

TABLE 2. CHANGES AND COMPARISONS IN DEVELOPMENT/DISTURBED AREA ACREAGES

Area or Facility	Alternative A (No Action) Disturbance (in acres)	Alternative B Disturbance			Alternative C Disturbance			Comments / Explanation
		Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	
BULLFROG								
Bullfrog School	12.8	12.8	0.0	0.0	12.8	0.0	0.0	The proposed library would be added within the existing disturbed area.
Bullfrog NPS Maintenance Area	2.6	2.6	0.0	2.6	2.6	0.0	2.6	Under alternative C, the NPS maintenance area would be moved to the relocated concessioner housing area.
Bullfrog Concessioner Maintenance Area	2.7	3.2	2.2	.7	3.2	2.2	.7	A portion of the area used for alternative A, concessioner maintenance would be reclaimed. The remaining area would be redeveloped for expansion of the boat wash-down facility and expansion of the Village Center.
Bullfrog Village Center	2.0	3.0	0.0	0.0	3.0	0.0	0.0	Expansion area created from previous concessioner maintenance area.
Bullfrog Concessioner Housing and RV Park	10.6	0.0	0.0	1.4	0.0	0.0	0.0	A portion of the area used for alternative A concessioner housing / RV park would be redeveloped for family rental units and a portion reclaimed. Under alternative C, NPS maintenance area would be relocated in this area.
Bullfrog Family Rental Units	3.3	9.9	0.0	0.0	9.9	0.0	0.0	Expansion area from previous concessioner housing / RV park area.
Bullfrog Lodge and Parking Area	0.4	0.8	0.4	0.0	0.8	0.4	0.0	Expansion into new area adjacent to existing facilities
Bullfrog Campground	86.2	86.2	0.0	0.0	86.2	0.0	0.0	The existing campground includes developed and primitive loops. Alternative B and alternative C would upgrade within this existing area.
Bullfrog Employee Housing	2.7	30	27.3	0.0	30	27.3	0.0	Consolidation of employee housing would expand into new area adjacent to existing housing.
Bullfrog RV Park	3.8	4.2	0.4	0.0	4.2	0.4	0.0	Consolidation of campground services to include RV hookup sites would require expansion into new area adjacent to existing campground.
Bullfrog Seasonal Housing	9.7	12.2	2.5	0.0	12.2	2.5	0.0	Expansion into new area adjacent to existing seasonal housing facilities.

TABLE 2. CHANGES AND COMPARISONS IN DEVELOPMENT/DISTURBED AREA ACREAGES

Area or Facility	Alternative A (No Action) Disturbance (in acres)	Alternative B Disturbance			Alternative C Disturbance			Comments / Explanation
		Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	
Bullfrog Secured Storage	16.4	22.4	6.0	0.0	22.4	6.0	0.0	Expansion into new area adjacent to existing secured storage facilities.
Bullfrog Totals	153.2	187.3	38.8	4.7	187.3	38.8	4.7	
HALLS CROSSING								
Halls Crossing NPS Maintenance	2.3	2.3	0.0	0.0	2.3	0.0	0.0	No changes.
Halls Crossing Employee Housing Area	16.5	20	3.5	0.0	20	3.5	0.0	Expansion into new area adjacent to existing housing to consolidate facilities.
Halls Crossing Family Rental Units	2.9	8.7	5.8	0.0	8.7	2.7	0.0	Alternative B, expansion into new area adjacent to existing family rental units. Alternative C, a portion of expansion into new area and partial redevelopment of existing RV park.
Halls Crossing Village Center	1.4	1.8	0.4	0.0	2.0	0.6	0.0	Alternative B, expansion into new area adjacent to existing Village Center to consolidate facilities. Alternative C, expansion into new area adjacent to add visitor center and emergency services building.
Halls Crossing RV Park	3.1	3.9	0.8	0.0	0.0	0.0	0.0	Alternative B, expansion into new area adjacent to existing RV park. Alternative C, expansion within existing family rental unit site.
Halls Crossing Campground	6.9	6.9	0.0	0.0	10	3.1	0.0	Alternative B, no change. Alternative C, consolidation of campground services to include RV hookup sites would require expansion into new area adjacent to existing campground.
Halls Crossing Secured Storage / Concessioner Maintenance / Boat Wash-Down Facility	11.2	25.5	25	10.7	25.5	25	10.7	Alternatives B and C, expansion into new area adjacent to existing secured storage for concessioner maintenance relocation. Portion is previously disturbed area to be reclaimed/revegetated. Remaining area to be redeveloped into boat wash-down facility.

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Area or Facility	Alternative A (No Action) Disturbance (in acres)	Alternative B Disturbance			Alternative C Disturbance			Comments / Explanation
		Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	Proposed Area (acres)	Additional Disturbed Area (acres)	Restored Area (acres)	
Halls Crossing Roads and Parking	0.0	2.1	2.1	0.0	2.1	2.1	0.0	Alternatives B and C, expansion to provide access to new access road to secured storage.
Halls Crossing Totals	44.3	71.2	37.6	10.7	70.6	37.0	10.7	
HITE								
Hite Campground	0.7	0.7	0.0	0.0	0.7	0.0	0.0	Alternatives B and C, site improvements within the disturbed area.
Hite Employee Housing / Family Rental Unit Area	6.0	9.8	3.8	0.0	9.8	3.8	0.0	Alternatives B and C, expansion into new area adjacent to existing housing.
Hite Secured Storage	3.5	5.2	1.7	0.0	5.2	1.7	0.0	Alternatives B and C, expansion into new area adjacent to existing secured storage.
Hite Roads and Parking	0.0	2.0	2.0	0.0	2.0	2.0	0.0	Alternatives B and C, expansion to provide access to shoreline camping at low lake levels.
Hite Underground 100,000-gallon Potable Water Tank	0.1	0.1	0.0	0.0	0.1	0.0	0.0	Alternatives B and C, replacement of water tank with 100,000-gallon underground potable water tank. Existing tank mounted on a frame structure with minimal existing ground disturbance. Permanent disturbance with the new tank may result from manholes to access the tank; therefore, disturbance would be roughly the same.
Hite Totals	10.3	17.8	7.5	0.0	17.8	7.5	0.0	

Alternative B would result in an increase of 83.9 developed acres, and 15.4 acres of previously disturbed area being restored/revegetated.
Alternative C would result in an increase of 83.3 developed acres, and 15.4 acres of previously disturbed area being restored/revegetated.

Employee, Concessioner, and Partner Housing

Employee housing is provided within Glen Canyon NRA at Bullfrog, Halls Crossing, and Hite. There are a variety of types and locations for housing in each area to accommodate permanent and seasonal employees of the National Park Service, concessioners, and “partner” agencies such as state of Utah local representatives (Division of Wildlife Resources, Utah Division of Parks and Recreation), medical clinic staff, tri-county sheriff, and Kane County school employees. Providing housing is essential to uplake operations because of the remote nature of the location, utilization of seasonal employees, and that little or no private housing is available for rent outside the recreation area. All available permanent housing is typically occupied, and seasonal housing is fully occupied during the summer months.

Housing types at Bullfrog consist of individual and multiple or plex-style houses, trailer units (both single-family units and multiple-occupancy units), and dormitory units (figures 5 and 6). Housing is established in several locations as shown on figure 11. Single-family housing is located east of the visitor center (figure 8), concessioner trailer housing (figure 6) is located adjacent to the family rental units and shower and laundry facilities, and seasonal dormitory housing is located between the visitor RV park and the secured storage area. A concessioner employee RV park with 11 hookups for power is also available adjacent to the concessioner trailer housing. The existing Bullfrog housing inventory consists of 25 NPS units, 8 partner units, 77 concessioner units, and 96 concessioner seasonal employee dormitory units.

Housing types at Halls Crossing consists of individual manufactured homes, multiple or plex-style houses, and trailer units (both single-family units and multiple-occupancy units). Housing units are located southwest of the Village Center store and RV park. Existing housing inventory includes 8 NPS units and 42 concessioner units.



**FIGURE 5. CONCESSIONER HOUSING UNITS
AT BULLFROG**



**FIGURE 6. CONCESSIONER TRAILER HOUSING UNITS AT
BULLFROG**

Housing types at Hite consist of manufactured homes, multiple or plex-style houses, and trailer units (both single-family units and multiple-occupancy units). Housing is located south

of the main access road and east of the existing secured storage area. Three employee RV sites with hookups for power are also available and located within the employee housing area. Existing housing includes 6 NPS units and 10 concessioner units.

Under the no-action alternative, the current inventory of NPS and concessioner employee housing, along with existing partner housing at Bullfrog, Halls Crossing, and Hite, would be maintained at the current number, location, and type. These units would be maintained at the existing location with no major upgrades, although general maintenance would occur, as necessary, to permit continued use.

Overnight Accommodations

Uplake overnight accommodations consist of Defiance House Lodge (figure 7) and family rental units (figure 8). Defiance House Lodge is located on a hilltop overlooking the launch ramp and marina facilities at Bullfrog (figure 7). The lodge contains 48 motel units. Under the no-action alternative, the lodge would be maintained at the existing location with no major upgrades, although general maintenance would occur, as necessary, to permit continued use.



FIGURE 7. DEFIANCE HOUSE LODGE



FIGURE 8. TYPICAL FAMILY RENTAL UNITS

Family rental units are available at Bullfrog, Halls Crossing, and Hite. Each family rental unit contains a living area, kitchen, three bedrooms, and two bathrooms. There are eight family rental units at Bullfrog located adjacent to the concessioner employee housing and shower and laundry facilities, 20 family rental units at Halls Crossing are located adjacent to the store and RV park, and five family rental units at Hite located adjacent to the employee housing area (figure 8).

Under the no-action alternative, there would be no change to the location and variety of visitor overnight accommodations at Bullfrog, Halls Crossing, and Hite. Existing accommodations would continue to receive routine maintenance; however, there would be no change to the general condition of the facilities.

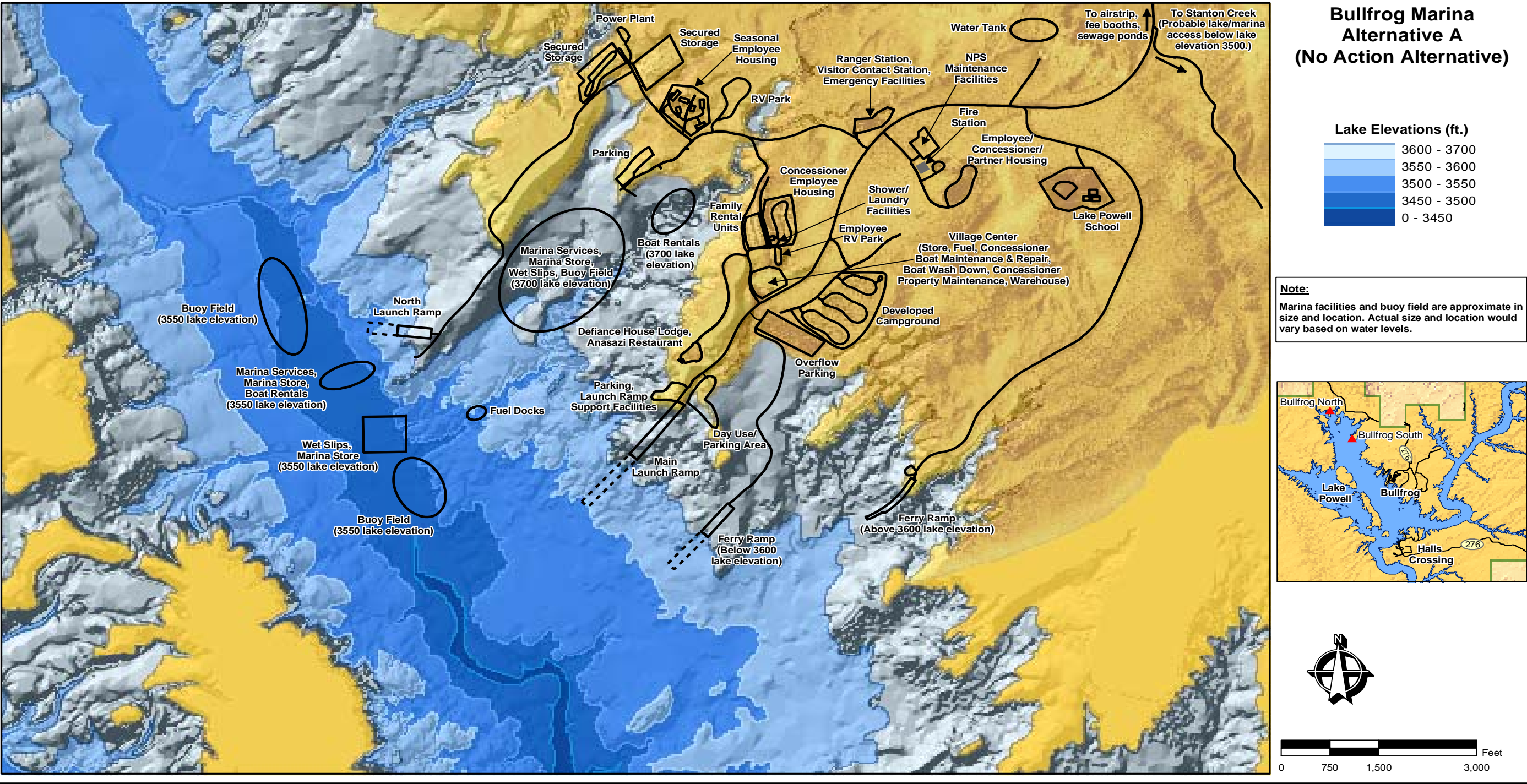


FIGURE 9. BULLFROG MARINA, ALTERNATIVE A: NO-ACTION ALTERNATIVE

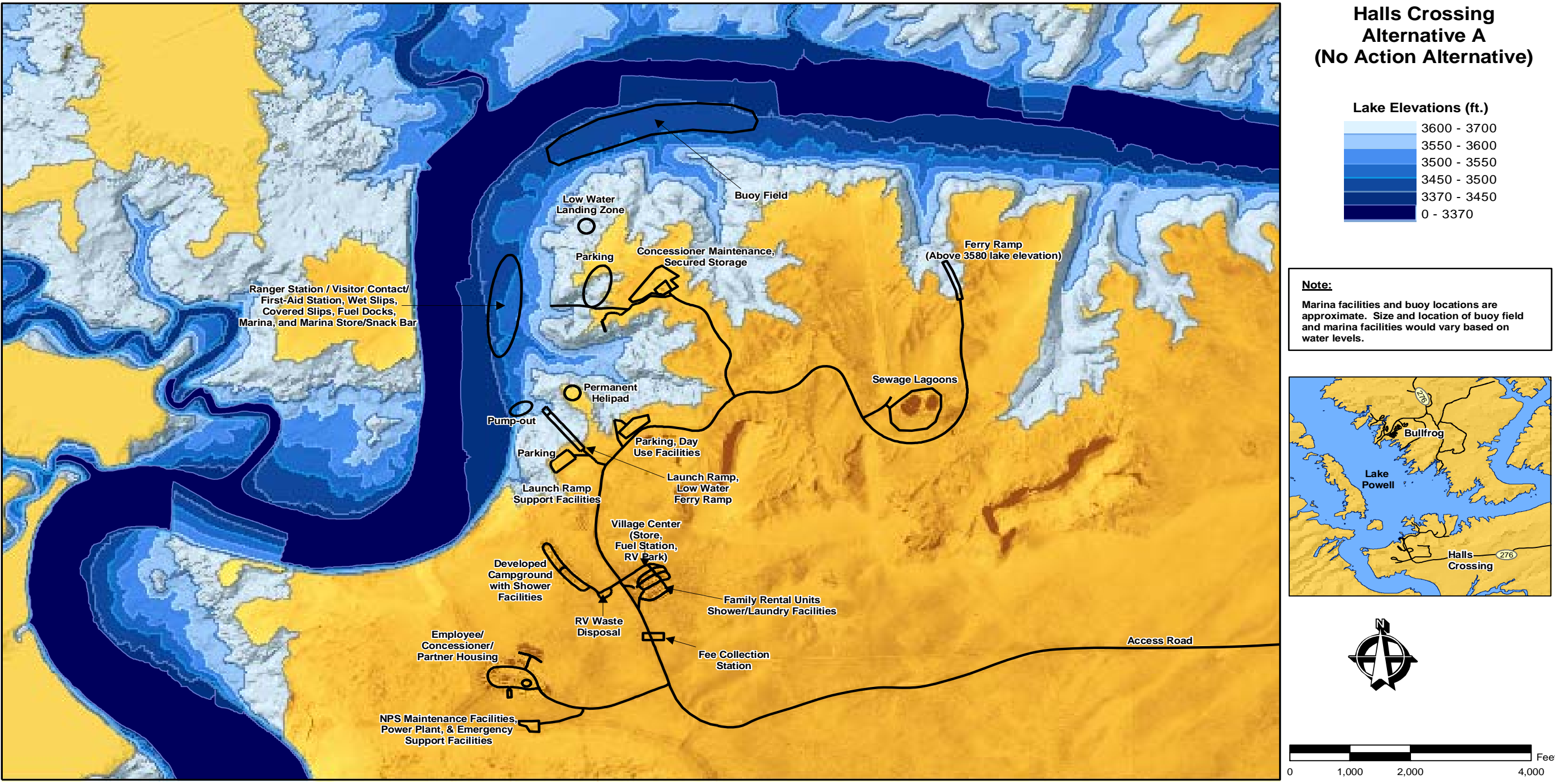


FIGURE 10. HALLS CROSSING MARINA, ALTERNATIVE A: NO-ACTION ALTERNATIVE

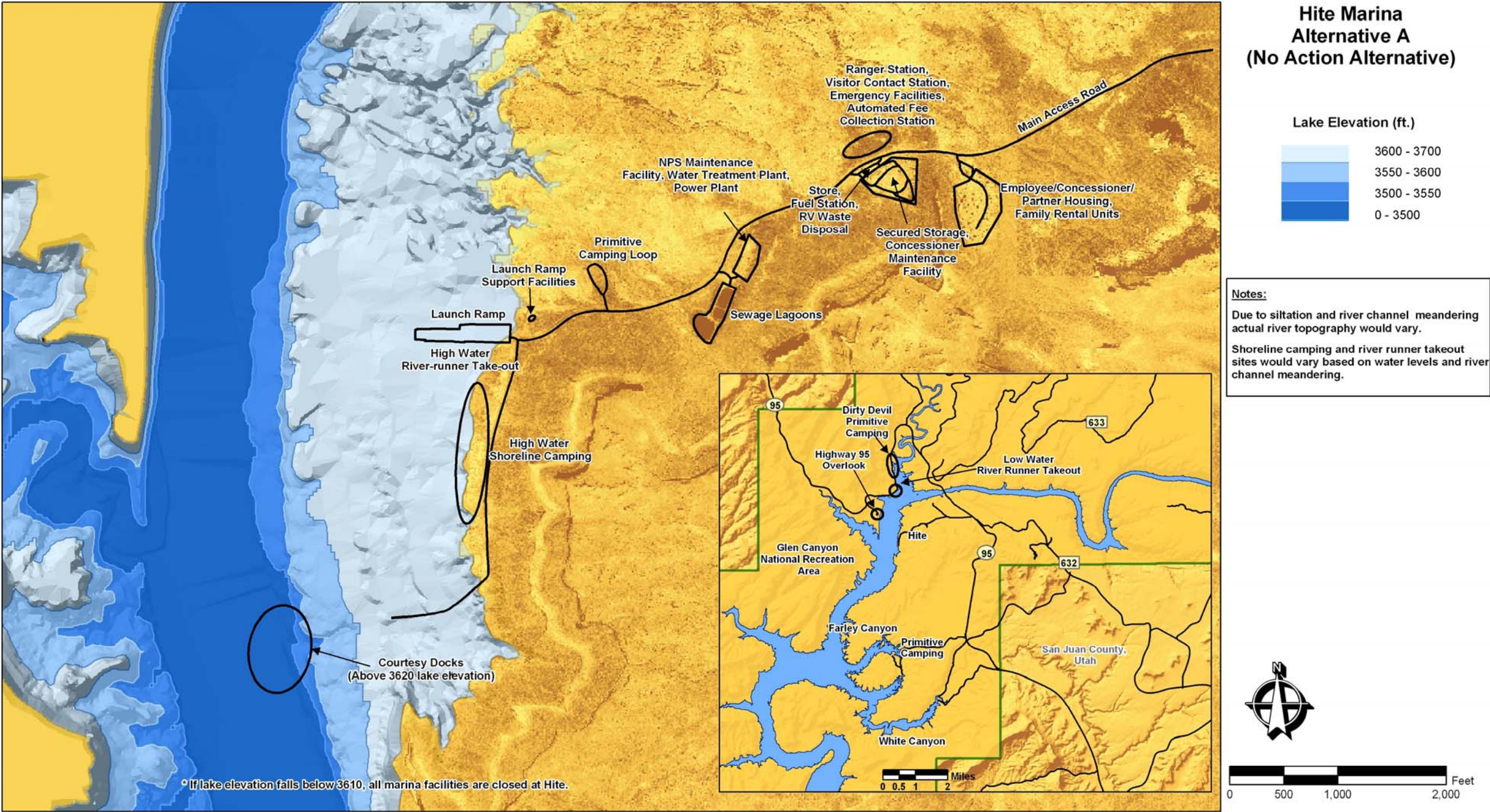


FIGURE 11. HITE MARINA, ALTERNATIVE A: NO-ACTION ALTERNATIVE

Visitor Camping

The Bullfrog campground is located east of the Village Center and currently consists of 78 developed camping sites with paved parking areas, designated tent pads, fire rings, grills, and picnic tables (see figure 11 and figure 12).



FIGURE 12. BULLFROG CAMPGROUND

There is a primitive loop for overflow camping to the north of the existing developed campground. The overflow loop contains approximately 88 sites with no amenities. The concession-operated Bullfrog RV park is located adjacent to the seasonal employee housing dormitories. The RV park consists of 24 sites: 20 pull-through and 4 back-in spaces that can accommodate RVs up to 50 feet in length (ARAMARK 2006). Sites include gravel turnouts, electrical hookup boxes offering 30-amp service, grills, and picnic tables.

Bullfrog also has primitive camping at North and South Bullfrog and Stanton Creek. The primitive camping does not include defined campsites or offer any amenities such as picnic tables or grills; however, restrooms are available at these locations on a seasonal basis. There is no designated group camping available in the uplake district (figure 12).

The Halls Crossing campground is located west of the store and RV park and currently consists of 64 developed camping sites with parking areas, picnic tables, and grills (see figure 10). The campground includes restroom and shower facilities with a waste disposal station located on the access road to the campground.

In addition to the Halls Crossing campground, there is an existing RV park located adjacent to the store and family rental units (figure 13). The RV park consists of 32 sites and includes gravel turnouts, electrical hookup boxes offering 30-amp service, grills, and picnic tables.

Camping at Hite is within the primitive camping area east of the public launch ramp (see figure 11). The Hite campground currently consists of an unpaved loop where camping is permitted, with space for approximately 25 undesignated sites. The camping is primitive, with limited site development and no water or restroom facilities. In addition to the campground loop, at high water there is shoreline camping adjacent to the public launch ramp. There are no facilities or designated camping areas associated with shoreline camping. Primitive car camping also occurs on the shoreline of the Dirty Devil River and Farley Canyon in the vicinity of Hite. No changes or improvements would be made to camping facilities or locations at Bullfrog, Halls Crossing, and Hite under the no-action alternative. Routine maintenance, as required, would occur.

Shower and Laundry Facilities

Shower and laundry facilities are available at Bullfrog and Halls Crossing; there are no shower or laundry facilities at Hite. Shower and laundry facilities at Bullfrog are located adjacent to the family rental units and concessioner housing and are used by visitors and employees. Shower and laundry facilities at Halls Crossing are located at the east end of the RV park and family rental unit area (see figure 13) and are used by visitors and employees. Additional shower facilities are located in the campground area used primarily by visitors. An employee laundromat facility is located in the employee housing area.



FIGURE 13. HALLS CROSSING RV PARK

Under the no-action alternative, the shower and laundry facilities at Bullfrog and Halls Crossing would be maintained at their current size and locations. No shower or laundry facilities would be constructed at Hite.

Land-Based Stores

A land-based store is defined as a store that is located and designed to service vehicle and foot traffic and is not specifically located or designed to handle boat traffic. Land-based stores exist at all three uplake developed areas. The land-based store at Bullfrog is located at the Village Center, south of the concessioner housing area and family rental units (figure 11 and figure 14). The existing Village Center store complex includes a fuel station, small convenience store, automotive repair shop, gift shop, and the concessioner administrative offices. The Village Center store complex is attached to the concessioner boat maintenance and repair facility.

The land-based store at Halls Crossing is located in the Village Center adjacent to the RV park and family rental units (figure 10). The land-based store includes a fuel station and small convenience store.

The land-based store at Hite is located on the main access road across from the ranger station and visitor contact station (figure 11). The land-based store includes a fuel station and small convenience store (figure 15). The RV waste disposal station is also located at the store.

Under the no-action alternative, the land-based stores at Bullfrog, Halls Crossing, and Hite would be maintained as existing facilities with no new additions or changes. Routine maintenance would occur, as necessary.



FIGURE 14. BULLFROG VILLAGE CENTER



FIGURE 15. HITE STORE

Land-Based Food Service

In the uplake district, land-based food service is available only at Bullfrog. The Anasazi Restaurant is a sit-down facility with 180-seat capacity located in the Defiance House Lodge (see figure 7). The restaurant is open for breakfast, lunch, and dinner. Under the no-action alternative, the Anasazi Restaurant would continue as currently operated without expansion or relocation.

Day-Use Facilities

Day-use facilities are designed for use by visitors for picnicking and relaxing. Day-use areas are distinct from camping or overnight-use areas. Facilities at day-use areas at Glen Canyon NRA typically include picnic tables, shade shelters, and restrooms. There are two designated day-use facilities in the uplake district: one located at Bullfrog and the other at Halls Crossing. There are no day-use facilities at Hite. The existing Bullfrog day-use facility is located at the top of the main launch ramp and is known as the boat-ready area. The day-use area contains picnic tables, restroom facilities, a fish cleaning station, waste disposal facilities (both trash and dump stations), and parking. The day-use facility also provides overflow parking for vehicles and trailers after boat launching. The Halls Crossing day-use facility is located adjacent to Halls Crossing Marina and contains picnic facilities. Under the no-action alternative, the existing day-use facilities would be maintained as they now exist, with no new improvements.

Ranger Station / Visitor Contact Station and Emergency Facilities

Ranger stations and visitor contact stations are available at all three uplake developed areas. The existing ranger station and visitor contact station at Bullfrog is located on the main access route to Bullfrog Village in the first building on the south side of the road after the entrance station. The facilities include a visitor center with exhibits and a small bookstore and ranger facilities with offices for rangers, maintenance, concession, interpretive, and other staff. The emergency facilities are within this building and include a small medical clinic (staffed in the

summer season only), emergency helipad, and emergency medical technicians and paramedic vehicles and facilities. Emergency facilities also include holding cells and a communication station. The fire station, located near the employee housing area, is also part of the emergency facilities. Search and rescue equipment is stored at the fire station.

The existing ranger station and visitor contact station at Halls Crossing is located on the water at the marina. The facilities include a small area for displays and brochures and ranger facilities, as well as a first-aid station. There are no designated emergency facilities at Halls Crossing. Emergency response equipment is housed in various locations. The fire engine is parked in the NPS maintenance building and the ambulance is parked outside in the NPS maintenance building yard. Equipment storage for search and rescue and fire fighting is located in a trailer in the NPS maintenance yard as well. A primitive emergency helipad area is designated within the Halls Crossing developed area, dependent on water levels.

The existing ranger station and visitor contact station at Hite is located on the main access road across from the store. The facilities include a small area for displays and brochures and ranger facilities. The emergency facilities at Hite are located at the ranger station and visitor contact station and include fire fighting and search and rescue equipment storage, and a helipad.

The ranger station / visitor contact station and emergency facilities at Bullfrog, Halls Crossing, and Hite would be maintained as they currently exist under the no-action alternative.

Concessioner Boat Maintenance and Repair and Property Maintenance Facilities

The concessioner-run boat maintenance and repair facilities and the concessioner property maintenance offices at Bullfrog are located at the Village Center adjacent to the Village Center store. The boat maintenance and repair facility is fenced with a 6-foot chain-link fence and includes a boat repair facility, boat painting facility, concessioner warehouse and maintenance building, and indoor and outdoor storage (figure 16). The concessioner offices are located above the Village Center gift store. A concessioner boat wash-down area is also located within this facility.

The concessioner-run boat maintenance and repair facilities and the concessioner property maintenance offices at Halls Crossing are located at the secured storage area, which is located northeast of the main launch ramp. The boat maintenance and repair facility is fenced with a 6-foot chain-link fence and facilities include a boat repair facility, a boat painting facility, concessioner warehouse and maintenance building, and indoor and outdoor storage. A small area for automobile repair is also included in this facility. There is also a concessioner-run floating boat maintenance facility at the Halls Crossing Marina.



FIGURE 16. BOAT MAINTENANCE AND REPAIR AND CONCESSIONER MAINTENANCE AREA AT BULLFROG

At Hite, the concessioner runs a limited boat maintenance and repair shop at the secured storage area located off the main access road, southwest of the store. The boat maintenance and repair facility is fenced with a 6-foot chain-link fence and facilities include a small boat repair facility, concessioner warehouse and maintenance building, and indoor and outdoor storage.

The concessioner boat maintenance and repair and property maintenance facilities at Bullfrog, Halls

Crossing, and Hite would be maintained as they exist under the no-action alternative.

National Park Service Maintenance Facilities

The National Park Service has existing maintenance facilities at all three uplake developed areas. The existing maintenance area at Bullfrog is located east of the ranger station / visitor contact station / emergency facilities. The maintenance facility includes a maintenance building and storage yard surrounded by a 6-foot chain-link fence.

The Halls Crossing maintenance area is located south of the employee housing area. The maintenance facility includes a maintenance building and storage yard surrounded by a 6-foot chain-link fence. Fire fighting and search and rescue equipment is also stored in this area.

The Hite maintenance area is located at the water treatment plant facility, east of the ranger station / visitor contact station / emergency facilities. The maintenance facility includes a maintenance building, storage yard, the water treatment plant, and generator building.

The NPS maintenance areas at Bullfrog, Halls Crossing, and Hite would be maintained in their current location and general condition under the no-action alternative.

Secured Storage

The secured storage at Bullfrog is located northwest of the seasonal employee housing area and currently provides 750 outdoor spaces for storage of boats, personal watercraft, and RVs in a large fenced area (figure 17). The secured storage at Halls Crossing is located northeast of the main launch ramp and currently provides 230 outdoor spaces for storage of boats, personal watercraft, and RVs in a large fenced area. The secured storage at Hite is located adjacent to the Hite store and currently provides 107 outdoor spaces for storage of boats, personal watercraft, and RVs in a small fenced area.



FIGURE 17. AERIAL VIEW OF HALLS CROSSING SECURED STORAGE AND CONSTRUCTION OF NEW ACCESS TO MARINA FACILITIES

Under the no-action alternative, the existing secured storage areas at Bullfrog, Halls Crossing, and Hite would be maintained in their current location and condition, with routine maintenance.

Utility Systems

The existing utility systems at Bullfrog include a power supply and distribution system, a water supply and distribution system, a wastewater removal and treatment system, and propane tanks. Three diesel generators located adjacent to the secured storage area supply power to Bullfrog. Power is distributed to various facilities by underground lines. The existing water supply consists of three wells and two 500,000-gallon storage tanks. The water is treated for drinking, primarily through the addition of chlorine, and is piped through buried pipelines for use at various facilities. The existing tank farm located in the NPS maintenance area stores 17,800 gallons of propane for distribution to the housing area.

Wastewater is carried from buildings and restroom facilities as well as from the RV disposal station and floating waste disposal stations. A number of lift stations are required to carry the wastewater uphill to the wastewater treatment plant. The wastewater treatment system, which includes the sewage lagoons, is located to the east of the entrance station. The wastewater

treatment system is currently in a multi-phased upgrade that would continue through to completion under the no-action alternative.

The existing utility systems at Halls Crossing include a power supply and distribution system, a water supply and distribution system, a wastewater removal and treatment system, and propane tanks. The power at Halls Crossing is supplied by three diesel generators located adjacent to the NPS maintenance area. Power is distributed through underground lines to various facilities at Halls Crossing. The existing water supply consists of two wells and a 360,000-gallon storage tank. Water is treated with a chlorination system and is then piped, primarily through buried pipelines, for use at various facilities.

Wastewater is carried from buildings and restroom facilities, as well as from the RV disposal station and floating waste disposal stations. A number of lift stations are required to carry the wastewater uphill to the wastewater treatment ponds. The wastewater treatment ponds comprise 6.41 acres and are located to the east of the main ferry launch ramp. There is also a propane tank farm at Halls Crossing located behind the store and operated by ARAMARK, with storage capacity for 10,000 gallons. Propane serves as the major heat source for the housing area.

At Bullfrog and Halls Crossing, as water levels recede, utility distribution lines below the full pool lake elevation of 3,700 feet are extended aboveground to the floating marina facilities. Under the no-action alternative, the power and water supply systems and wastewater removal systems would remain the same, as would the powerlines and water distribution pipelines, except in areas where water-based facilities are being relocated. In these areas, utility distribution lines would continue to be laid on the ground surface, typically following access routes to the relocated facilities. The wastewater removal systems would continue to be extended as water levels recede and water-based facilities move farther out into the lake. Additional lift stations may also be required to carry the wastewater uphill from the relocated facilities.

The existing utility systems at Hite include a power supply and distribution system, a water supply and distribution system, a wastewater removal and treatment system with sewage lagoons, and propane storage tanks. The power at Hite is supplied by a diesel generator located in the NPS maintenance area. Power is distributed through underground lines to various facilities at Hite. The water supply at Hite is obtained from a river intake pipe when the lake elevation is above 3,620 feet, and from a water well when lake elevation drops below 3,620 feet. The water is piped to a water treatment plant and then into a 100,000-gallon aboveground tank. The existing propane tank farm is operated by ARAMARK, has storage capacity of 17,500 gallons, and is located in the housing area and at the store.

Under the no-action alternative, the existing utility systems at Bullfrog, Halls Crossing, and Hite would not change, although maintenance and repairs would continue.

Roads and Parking

Existing paved roads and parking areas in the Bullfrog developed area are shown on figure 9. Roads are continually being extended to reach floating and shoreline facilities as water levels recede. These road extensions have dirt or gravel surfaces below the full pool lake elevation of 3,700 feet. Unpaved parking areas are also being created as the marina facilities are relocated due to decreasing water levels. These roads and parking areas will be covered as water levels rise.

Existing paved roads and parking areas in the Halls Crossing developed area are shown on figure 10. A new gravel access road and parking area have been constructed to access the relocated Halls Crossing water-based facilities in the main channel. The new gravel access road and parking area are located to the west of the secured storage area and the road continues west to the relocated docks and marina facilities (figure 10). Additional new roads and parking areas would continue to be constructed to maintain lake access.

Existing paved roads and parking areas in the Hite developed area are shown on figure 9. No changes to the existing Hite paved road system would occur under the no-action alternative.

Fee Collection System

The two existing staffed fee collection kiosks are located along the main access road into Bullfrog. An automated fee collection system is located at the fee collection kiosk for use when the fee collection booths are unmanned. There are both fee collection kiosks and an automated fee collection system at Halls Crossing, located on the main access road south of the store. There is an automated fee collection system at Hite located at the visitor contact station parking area. No changes to the fee collection systems or facilities would occur in the uplake developed areas under the no-action alternative.

School

The Lake Powell School, located in the Bullfrog development, is administrated by Kane County and serves children in kindergarten through grade 12 from Bullfrog, Halls Crossing, and surrounding communities. The school is located east of the combined employee housing area. Children are bussed in from surrounding communities. Under the no-action alternative, the Lake Powell School would be maintained, as necessary, with no upgraded amenities.

Airstrip

An asphalt airstrip is maintained at Bullfrog with shuttle service from the airstrip to Bullfrog facilities. The airstrip is available for use both day and night, although night landings are for emergencies only. The airstrip is located north and west of the main entrance station for Bullfrog. There is no airstrip located within NRA boundaries at Halls Crossing. A private airstrip is maintained outside of the NRA. There is an existing packed gravel airstrip at Hite with a gravel parking area. There would be no change under the no-action alternative to the uplake district airstrips.

Boat Wash-Down Area

The only existing boat wash-down facility uplake (to prevent the spread of aquatic nuisance species by washing boats prior to entry into Lake Powell) is at Bullfrog; there are no boat wash-down areas at Halls Crossing or Hite. The boat wash-down facility is located in the concessioner maintenance area in the Village Center and is not available for use by the general public. Under the no-action alternative, there would be no change to the Bullfrog boat wash-down area, and no wash-down areas would be constructed in the other uplake developed areas.

Marina Facilities

The existing water-based facilities at Bullfrog include rental facilities and associated services, courtesy docks, executive services (boat cleaning and preparation), boat tours, wet moorage (buoy field and wet slips), fuel docks, two-cycle engine oil dispensing system, and pump-out docks (figure 18). The Bullfrog, Halls Crossing, and Hite DCPs from 1985 established maximum numbers for wet moorage. Those figures were used to establish maximums for the lifespan of the current concession contract. Full implementation of those numbers has not occurred. Table 3 outlines these numbers for comparison of wet moorage. The NPS slips at Bullfrog and Halls Crossing, combined total of 16 slips, are included in the total wet moorage numbers shown in the table.



FIGURE 18. AERIAL VIEW OF WET SLIPS AND WATER-BASED STORES AT BULLFROG

TABLE 3. WET MOORAGE SUMMARY

	Moorage Numbers (permitted in 1985 DCPs)	Moorage Numbers (permitted under current concession contract)	Current Moorage Numbers Implemented
Bullfrog			
Slips	400	400	440
Buoys	200	200	220
Total	600	600	660
NPS Slips			12
Halls Crossing			
Slips	240	240	180
Buoys	150	150	234
Total	390	390	414
NPS Slips			4
Hite			
Buoys	N/A	54	0*
Concessioner Wet Moorage – All Lake Elevations		1,044	1,074
Total Wet Moorage (concessioner & NPS)			1,090

*Hite buoys were permanently relocated to Bullfrog and Halls Crossing.

There are up to 440 moorings currently available for rental slips, overnight slips, courtesy slips, executive services, and the rental fleet boats. Of this number, 40 are for overnight and courtesy slips. An additional 220 moorings are available in the buoy fields (figure 22). An additional 12 slips are available for NPS operations for a total of 672 wet moorings. There are 134 boats available for rent at Bullfrog.

The existing water-based facilities at Halls Crossing include courtesy docks, executive services (boat cleaning and preparation), wet moorage (buoy field and wet slips), fuel docks, floating private boat repair, pump-out docks, and floating restrooms. There are up to 180 moorings currently available for rental slips, overnight slips, courtesy slips, and executive services. Of this number, 6 of the slips are for overnight and courtesy slips. An additional 234 moorings are available in the buoy fields. An additional 4 slips are available for NPS operations for a total of 418 wet moorings. There are 3 boats available for rent at Halls Crossing. Under the no-action alternative, the existing marina facilities at Bullfrog and Halls Crossing would be maintained in their current location and at their current level of service. The location for the marina facilities at Bullfrog would vary based on water levels. Several potential locations for the Bullfrog Marina, based on lake elevation, are shown on figure 9.

In the past, water-based marina facilities at Hite included a small rental fleet and wet moorage consisting of 54 buoys and associated services, courtesy docks, fuel docks, a floating minor boat repair facility, boat pump-out docks, and a floating store. Declining lake levels due to drought between the years 1999 and 2004, resulted in the closure of water-based facilities at

Hite (figure 19) and permanent relocation of the infrastructure to Bullfrog and Halls Crossing. Under the no-action alternative, there are no water-based facilities at Hite.



FIGURE 19. HITE LAUNCH RAMP AT LOW WATER

Water-Based Stores

There are currently two floating stores at Bullfrog: one store located at the rental docks (referred to as the Boat-N-Go) and the other located at the wet slips (referred to as the Dock and Stock). There is a floating store at the main marina at Halls Crossing. Under the no-action alternative, there would be no changes to the existing water-based stores at Bullfrog and Halls Crossing and no floating store at Hite.

Water-Based Food Service

Under existing conditions at Bullfrog, there are no water-based food service facilities. The water-based store at Halls Crossing includes a water-based snack bar offering a limited menu. There is no water-based food service facility at Hite. Under the no-action alternative, there would be no changes to the existing water-based food service offered at Halls Crossing, nor would water-based food services be added to any of the uplake developed areas.

Public Boat Launch Capabilities

There are two public boat launch ramps at Bullfrog. The main public launch ramp is located adjacent to the day-use area. A 150-foot-wide paved launch ramp is available to a lake elevation of 3,605 feet, with the ramp narrowing to an 80-foot-wide paved ramp between the lake elevations of 3,605 and 3,580 feet (figure 20). Below a 3,580-foot lake elevation, near the main launch ramp, there is an old access road surfaced with cold mix asphalt that is available for use as a launch ramp. A second launch ramp was constructed as shown in figure 9 and is called the north launch ramp. This ramp is a paved 50-foot-wide launch ramp operational between lake elevations of 3,583 and 3,557.

There is one public launch ramp at Halls Crossing. The main public launch ramp is located west of the marina facilities. The 110-foot-wide paved launch ramp is available to a lake elevation of 3,550.



FIGURE 20. MAIN LAUNCH RAMP AT BULLFROG DEVELOPED AREA

The public launch ramp at Hite is paved to a 110-foot width down to a lake elevation of 3,640 feet. The ramp continues as a 30-foot-wide unpaved ramp between the lake elevations of 3,640 and 3,620. Below a lake elevation of 3,620, the ramp is gravel and dirt, and is not maintained, but is available for launching at Hite at the boaters' own risk.

The supplemental calculations to the 1987 Carrying Capacity Study calculated the capacity of public launch facilities in the uplake district to launch boats on a 24-hour basis, assuming 12 hours each for launch and retrieval. The exact volume of existing launches is not known; however, NPS staff has determined that the maximum capacity of the launch ramp is not fully utilized based on field observations of typical launch days over a 24-hour period.

Launch ramps would be maintained in the existing condition under the no-action alternative, with maintenance as needed.

TABLE 4. LAUNCH RAMPS

Developed Area	Name	Status
Hite	Public Launch Ramp	Paved at 110-foot width to 3,640 feet Unpaved at 30-foot width to 3,620 feet Unimproved gravel/dirt route to Colorado River shoreline
Bullfrog	Main Public Launch Ramp	Paved at 150-foot width to 3,605 feet Paved at 75-foot width to 3,580 feet Hardened surface at 50-foot width below 3,580 feet Bullfrog Bay becomes unusable near 3,500 feet and new ramp location would be required
	North Public Launch Ramp	Paved at 80-foot width to 3,557 feet
	Ferry Ramp	Usable to 3,600 feet Alternate ramp usable to 3,555 feet or lower
Halls Crossing	Main Public Launch Ramp	Paved at 110-foot width to 3,572 feet Paved at 80-foot width to 3,550 feet
	Ferry Ramp	Usable to 3,580 feet Alternate ramp (main public launch ramp) usable to 3,550 feet

Launch Ramp Support Facilities

Existing launch ramp support facilities at Bullfrog and Halls Crossing are located at the top of the launch ramp and include parking for vehicles and boat trailers, restrooms, a fish cleaning station, and the boat ready area that also functions as a day-use area. At Bullfrog, there is a small turnout at the top of the launch ramp to allow derigging and trash disposal. The launch ramp support facilities at Hite are also located at the top of the launch ramp, and include restrooms, a fish cleaning station, porta-potty waste disposal station, parking area for vehicles and boat trailers, and a shade shelter with wayside exhibit. There would be no change to the existing launch ramp support facilities at Bullfrog, Halls Crossing, and Hite under the no-action alternative.

Ferry Service Facilities

Ferry services operated by UDOT are currently available between Bullfrog and Halls Crossing. Ferry service is offered from several separate launch ramp locations in both Bullfrog and Halls Crossing areas, depending on water level. At Bullfrog, the main ferry ramp is operational at lake elevations above 3,600 feet. The Halls Crossing ferry service facilities include the main ferry ramp that is operational at lake elevations above 3,580 feet. As shown on figure 10, the ferry launch ramp at Halls Crossing is at the public launch ramp below a lake elevation of 3,580 feet. The National Park Service maintains the ferry ramps, but is not involved in ferry operations.

As shown in figure 9, below a lake elevation of 3,600 feet, the ferry launch ramp at Bullfrog is accessed by a gravel road located adjacent to the overflow parking area. No changes to the Bullfrog or Halls Crossing ferry service facilities would occur under the no-action alternative.

River Runner Takeout

The Hite public launch ramp serves as the take-out point for rafters on the Colorado River at the inlet to Lake Powell. The launch ramp takeout is usable between 3,700 to 3,620 feet lake levels. Below that elevation, the river runner takeout is relocated to a temporary location upstream and across from the Hite launch ramp. The current river takeout location is shown on figure 9. Under the no-action alternative, Glen Canyon NRA would continue to maintain a takeout at Hite. Because the river channel is subject to meandering and movement, the low water takeout may not always function due to changes in topography, shoreline access, and siltation patterns. If conditions occur that the low water takeout or the Hite ramp no longer function for this use, additional site investigation, compliance, and U.S. Fish and Wildlife Service (USFWS) consultation would be required to relocate this facility to another place along the river channel.

ALTERNATIVE B (PREFERRED ALTERNATIVE)

Alternative B is the preferred alternative. The preferred alternative is the NPS preferred alternative (and is the proposed action for section 106 compliance) and defines the rationale for the action in terms of resource protection and management, visitor and operational use, costs, and other applicable factors. All actions described in the preferred alternative are consistent with the approved 1979 GMP and related recreation area documents.

Alternative B represents changes to current facilities in the form of facility upgrades, expansion, or improvements generally keeping with approved plans and anticipated future needs including increases to employee, concessioner, and visitor services, and paving launch ramps. This alternative also reorganizes and relocates some marina services among the three marinas. The location of facilities under alternative B for Bullfrog, Halls Crossing, and Hite are shown in figures 21, 22, and 23, respectively. Table 1 contains a summary of the changes under alternative B, as well as a comparison with alternatives A and C. Table 2 contains changes in disturbed area acreages as a result of alternatives A, B, and C. Table 5 provides a comparison of the alternatives with the project objectives. Facilities that would not change from the existing condition as a result of alternative B are not discussed in detail in the following sections. Those facilities that would remain unchanged from the existing condition, except for routine maintenance and repairs, would include the following:

- Bullfrog day-use facilities
- Bullfrog and Hite visitor contact / ranger station and emergency facilities
- concessioner boat maintenance and repair and property maintenance facility at Hite
- NPS maintenance facilities at Halls Crossing and Hite
- Halls Crossing and Hite fee collection systems

- airstrips at Bullfrog and Hite
- Hite Marina facilities
- water-based stores at Bullfrog, Halls Crossing, and Hite
- Hite launch ramp
- launch ramp support at Bullfrog and Halls Crossing
- river runner takeout at Hite

Employee, Concessioner, and Partner Housing

At Bullfrog, under alternative B, all long-term employee trailer housing would be consolidated into one area northeast of the Bullfrog campground. Trailer housing would be replaced with permanent housing comprised of single-family homes, duplex, and multiplex units. Seasonal employee housing would be upgraded and expanded at the existing site southwest of secured storage (figure 21). The current concessioner trailer housing area would be reclaimed.

Increased visitation is anticipated in the future and additional staff would be needed to operate facilities and visitor services. Privately owned housing for rent or purchase outside the NRA is nonexistent. Up to 4 additional NPS housing units (for a total of up to 29 units), up to 24 additional concessioner housing units (for a total of up to 197), and up to 6 additional partner housing units (for a total of 14) would be added at Bullfrog to serve the school and provide staff for interagency law enforcement. The 24 additional concessioner housing units would consist of construction of an additional dormitory or efficiency unit building within the seasonal housing area shown on figure 21.

The existing public RV park at Bullfrog would be upgraded and converted to an employee RV park with the number of sites remaining at 24. A building with shower and laundry facilities would be added in the vicinity of the seasonal housing and employee RV park. Some seasonal and concession employees are retired and work seasonally, living out of their RVs. An employee RV park provides efficient and economical housing options for some seasonal employees. The existing concessioner RV park, adjacent to the existing concessioner housing area, would be removed and revegetated with native plants.

The existing employee trailer housing units at Halls Crossing and Hite would be replaced with new housing units. Up to 2 additional permanent NPS housing units (for a total of up to 10 units) and up to 4 additional concessioner units (for a total of up to 46 units) would be added at Halls Crossing. An employee RV park providing housing for temporary employees would be constructed at Halls Crossing for up to 12 RV sites.

No additional housing would be added at Hite; however, the existing housing would be replaced with new housing units.

Overnight Accommodations

Under alternative B, Defiance House Lodge and family rental units at Bullfrog would be expanded so that up to a total of 94 units would be added (for a total of up to 150 units). The allocation of lodge units versus family rental units would be determined by the National Park Service in conjunction with the concessioner. The Defiance House Lodge facilities would be upgraded. At Halls Crossing, up to an additional 40 family rental units (for a total of up to 60 units) would be constructed. The existing family rental unit trailers at Bullfrog and Halls Crossing would be replaced with new units (figure 22).

The number of family rental units available at Hite would be increased by up to 15 units (for a total of up to 20 units), and would be located in the same area as the existing units (in the same area as the employee and concessioner housing as shown on figure 23). The existing family rental trailer units would be replaced with new units.

Visitor Camping

Under alternative B, the developed campground at Bullfrog and the Bullfrog RV park would be consolidated in the existing campground location (figure 21). Anticipated increases in visitation in the future would result in increased demand for visitor camping. The combined campground and RV park would be expanded by up to 128 sites (for a total of up to 230 sites), with approximately two-thirds of the new sites offering hookups with 50-amp electrical service, and nonhookup sites. The balance of the nonhookup sites would be divided between a designated group camping area and walk-in tent sites. The new group camping area is envisioned to consist of a “pod” of 6 sites, each of which could accommodate up to 8 tents and 15 people per site. A site analysis and design concept plan was developed for the Bullfrog campground (NPS 1998b). The proposed increases in numbers of campsites represent the maximum number of campsites that could be expected with full development of the area designated for camping. The proposed campsites would be developed to accommodate a variety of camping vehicle sizes, circulation patterns, and visitor camping experiences.

A small store, shower and laundry facility, and amphitheater would be added. The RV waste disposal station would be upgraded at the Bullfrog campground. Consolidation of these services at the campground location would improve the efficiency of operation of the Bullfrog development. No improvements would be made to primitive camping at North and South Bullfrog and Stanton Creek.

The Halls Crossing campground would be upgraded in the current location, including site upgrades and upgrades to the restroom facilities. The RV waste disposal station would also be upgraded in the current location. At the RV park, hookups would be upgraded to include 50-amp electrical service, and up to 8 additional RV sites would be added (for a total of up to 40 sites). Increased demand for RV sites would be expected with upgrading of available service. The proposed increases in numbers of campsites represent the maximum number of campsites that could be expected with full development of the area designated for camping.

The existing primitive campground would be upgraded at Hite. Upgrades would include defining up to 25 nonhookup sites in the campground loop (figure 23) to include campsites,

picnic tables, fire rings, and grills. A centralized water source would be installed at the campground and restroom facilities would be added.

Under alternative B, there would be no change to shoreline camping at Hite for lake elevations above approximately 3,620 feet. Primitive camping would be available along the shoreline, the Dirty Devil River, and at Farley Canyon. Below a lake elevation of approximately 3,620 feet, shoreline camping would be permitted on the Colorado River at designated camping sites. This area would be upstream of the Hite launch ramp as shown in figure 23. Micro flush toilets would be installed if determined necessary based on campsite use.

Shower and Laundry Facilities

Under alternative B, the existing shower and laundry facilities at Bullfrog would be removed and new shower and laundry facilities would be constructed at the campground, primarily for visitor use. The existing shower facilities at the campground and at the RV park at Halls Crossing would be removed. The Village Center at Halls Crossing would be upgraded to include shower and laundry facilities for employees and visitors. The land-based store at Hite would be expanded to include visitor and employee shower and laundry facilities.

Land-Based Stores

Under alternative B, the store at the Village Center at Bullfrog would be expanded to provide a greater supply of items and food service. The warehouse and boat maintenance and repair facility would be moved, allowing the store to expand into this area. A campground store would be added at the Bullfrog campground to increase the variety of items offered and expand use of the facilities.

The Village Center store at Halls Crossing would be upgraded by replacing it with a larger building. The new building would provide adequate storage for supplies, land-based food service, and shower and laundry facilities. The fuel station area would be regraded and the pavement replaced to eliminate uneven areas.

Under alternative B, the land-based store at Hite would be upgraded and expanded to include shower and laundry facilities and to provide a potential food service facility. The building would undergo aesthetic improvements such as painting and the addition of a shade cover. The concrete pad around the fueling area would be replaced and extended. The concessioner secured storage and maintenance area adjacent to the store would be visually screened from the store. The RV waste disposal station would be upgraded with a new pump-out and containment pad.

Land-Based Food Service

Under alternative B, the Anasazi Restaurant at Bullfrog would be expanded by up to 70 seats (for a total of up to 250 seats). An additional food service facility would be added at the expanded Village Center store.

At Halls Crossing, a food service facility would be added to the expanded Village Center store. The store at Hite would be expanded to provide a potential food service facility in the form of a small snack bar operated seasonally or as demand warrants.

Day-Use Facilities

Under alternative B, a second day-use facility would be constructed at Halls Crossing (as shown on figure 22) to include picnic tables, shade shelters, and restroom facilities. A day-use facility would be constructed at Hite at the top of the launch ramp. A partnership with UDOT would be developed for the purpose of pursuing upgrades to the SH 95 overlook to include a defined day-use area with picnic tables, shade shelters, and micro-flush toilets.

Ranger Station / Visitor Contact Station and Emergency Facilities

Under alternative B, the permanent helipad would remain at Halls Crossing. The helipad site would be upgraded to include a hardened, painted surface for landing, and a wind sock. The low water landing location for helicopters at Halls Crossing would be the parking lot adjacent to the marina.

Concessioner Boat Maintenance and Repair and Property Maintenance Facilities

The concessioner rental boat maintenance and repair facilities and property maintenance facilities at Bullfrog would be moved from the existing location adjacent the Village Center to the secured storage area, northwest of the employee RV park. Visual screening would be enhanced at the new location to conceal the repair and storage areas from the general public. Space vacated at the Village Center would be used to expand the Village Center store and food service.

The secured storage area at Halls Crossing, including the boat maintenance and repair and property maintenance facilities, would be relocated to the old airstrip area, which is less visible from all points at Halls Crossing.

Secured Storage

Under alternative B, the secured storage area at Bullfrog would be expanded by up to 250 spaces (for a total of up to 1,000 spaces). An enclosed storage building with screening would be constructed and stacked storage would be used, if feasible. The facility screening would be improved to provide some mitigation for the visual impacts of the storage area.

The secured storage area at Halls Crossing would be relocated to a less visible location as shown in figure 22, which is an area already disturbed by an old airstrip. The new secured storage area would include an addition of up to 170 spaces (for a total of up to 500 spaces), an enclosed storage facility, and visual screening, as well as being surrounded by a 6-foot chain-link fence and locking gate. Covered storage would be made available.

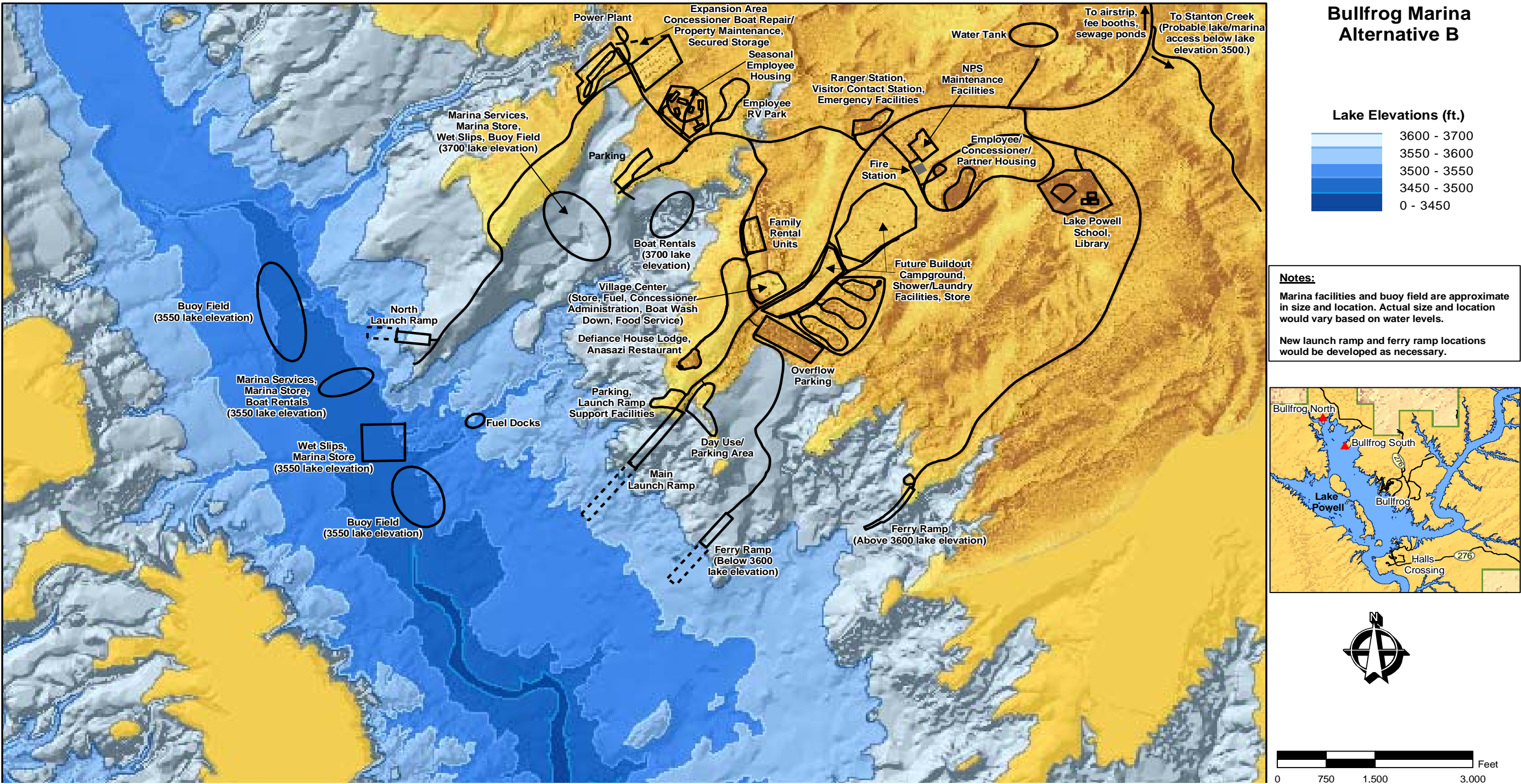


FIGURE 21. BULLFROG MARINA: ALTERNATIVE B

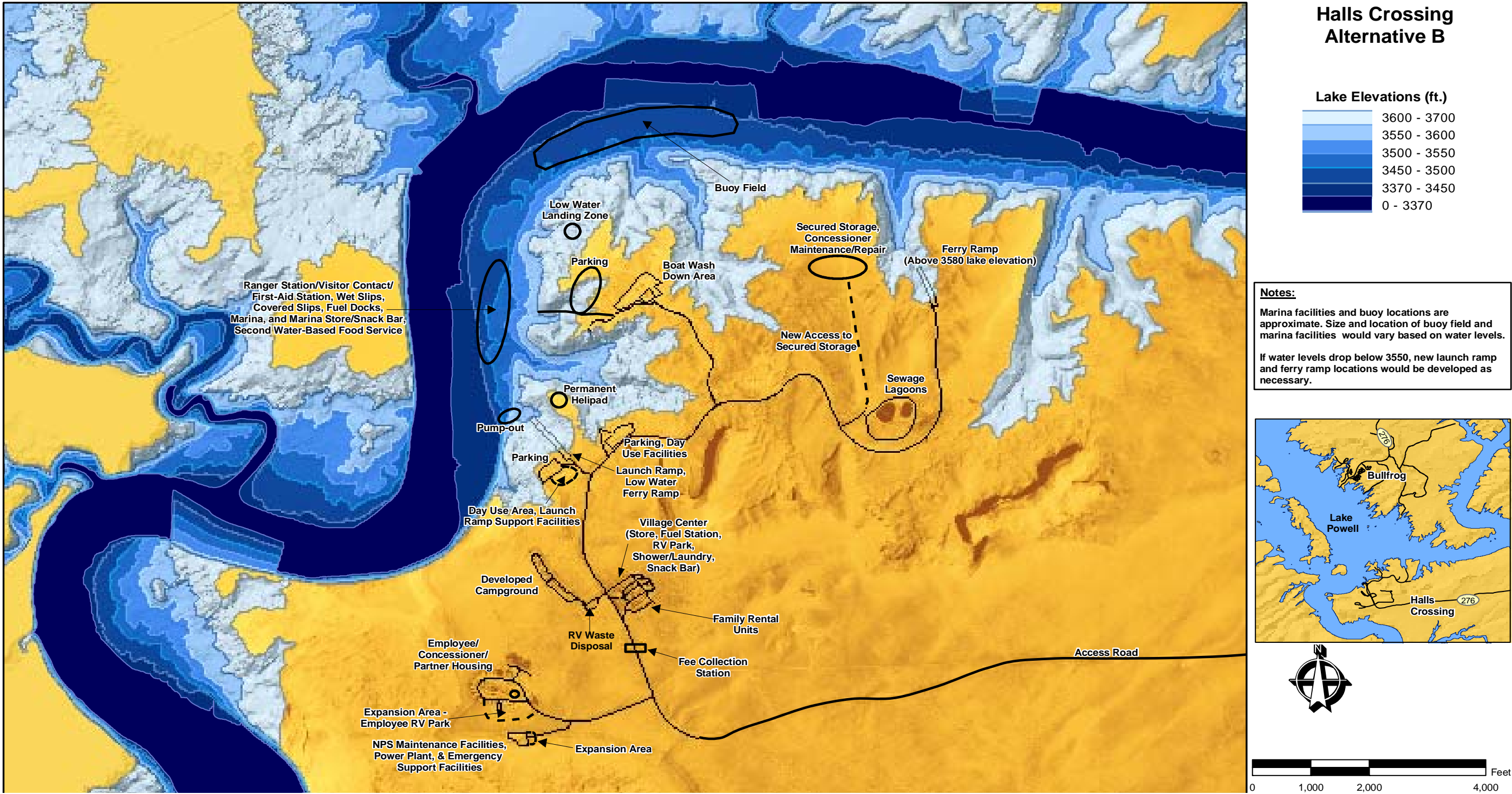


FIGURE 22. HALLS CROSSING MARINA: ALTERNATIVE B

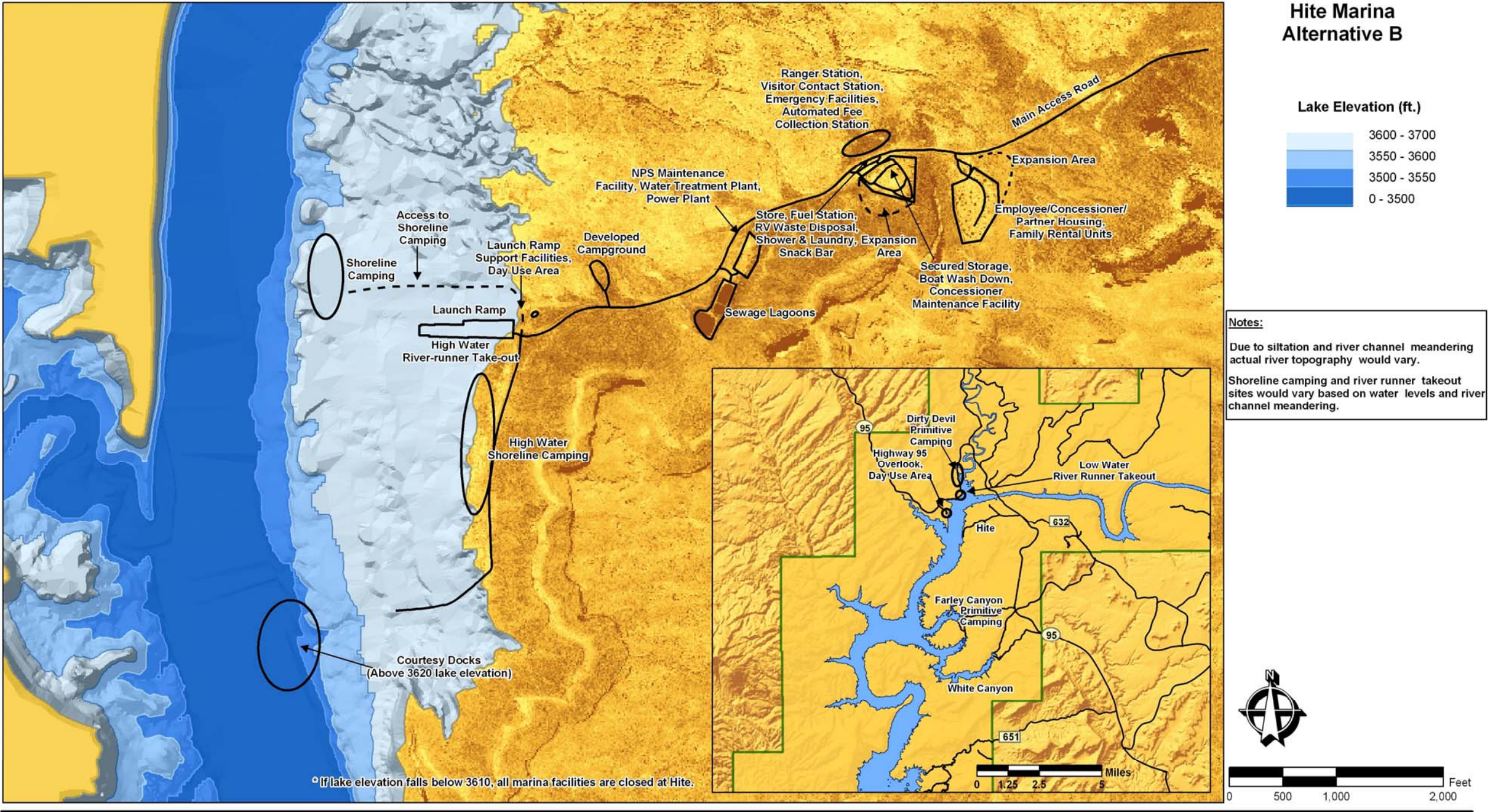


FIGURE 23. HITE MARINA: ALTERNATIVE B

The secured storage area at Hite would be expanded by up to 53 spaces (for a total of up to 160 spaces), and include construction of a boat wash-down facility for visitor and concessioner use.

Utility Systems

Under alternative B, the existing utility supply and distribution systems at Bullfrog, Halls Crossing, and Hite would be expanded as needed to provide adequate service for increased development. At Hite, a 100,000-gallon underground water storage tank for potable water would replace the existing aboveground water storage tank in the same general location. Because soils in this area are shallow, blasting may be required to bury the underground tank. Any blasting would conform to specifications in NPS 65, *Explosives Use and Blasting Program* (1991). All blasting would use the minimum amount of explosives necessary to accomplish the task. Upon completion of installation of the water tank, the area would be covered with conserved topsoil, regraded to match natural contours, and revegetated.

Roads and Parking

Under alternative B, at Halls Crossing, a new road would be constructed to access the relocated secured storage. At Hite, an unimproved road would provide access to primitive low-water designated shoreline camping.

Fee Collection System

Under alternative B, the existing fee collection booth at Bullfrog would be upgraded for accessibility and administrative services.

School

Under alternative B, the Lake Powell School would be expanded to include a library building.

Boat Wash-Down Area

Under alternative B, the boat wash-down facility at Bullfrog would be expanded to provide additional wash-down facilities in the same location (at the former concessioner maintenance area at the Village Center) for public access. Boat wash-down facilities would be constructed at Halls Crossing in the old secured storage area and at Hite at the concessioner maintenance facility.

Marina Facilities

Under alternative B, wet moorage (wet slip and buoy field moorings) would be managed jointly between Halls Crossing and Bullfrog. Buoy field moorings would be increased by up to 55

spaces, for a combined total of 1,145, including visitor, concessioner, and NPS wet mooring spaces for Bullfrog and Halls Crossing. The rental boat fleet would be allowed to expand up to a combined total of 580 boats. The concessioner, in conjunction with the National Park Service, would determine how to allocate this total between the two sites based on customer preference, season, water level, and other factors. The existing water-based facilities at Halls Crossing would be upgraded under alternative B to include a fishing dock. The balance of marina facilities at Bullfrog and Halls Crossing would be the same as presented under alternative A.

Water-Based Food Service

Under alternative B, an 80-seat water-based restaurant would be provided at the Bullfrog Marina. An additional water-based food service facility would be added at Halls Crossing.

Public Boat Launch Capabilities

Under alternative B, the existing Bullfrog launch ramp would be maintained at its current width (ranging from 80- to 150-feet wide). Any new additional lengths needed to reach lower water levels would be constructed at a maximum of 80-feet wide. If the existing launch ramp becomes unusable due to extreme low water, a new launch ramp no more than 80-feet wide would be constructed within the developed area (see figure 21), which would require additional environmental evaluation and consultation at that time. The environmental consequences of construction of a new launch ramp in a new location will not be evaluated as part of this DCP. The existing launch ramp at Halls Crossing would be maintained at its current configuration. Any additional length necessary to reach low water would be 80 feet in width. As no other launch sites are available at Halls Crossing once the water level recedes below an elevation of 3,550 feet, launching would revert to “ramp closed—launch at your own risk.”

Ferry Service Facilities

Under alternative B, ferry services at Bullfrog would continue to be provided by a docking wedge and associated access. The docking wedge would continue to be moved within the developed area (figure 21) to accommodate lower water levels. At Halls Crossing, the ferry would either be launched at its current location or moved to the main launch ramp as the water level recedes. Once the water level has receded lower than 3,550 feet and the main launch ramp is closed, a new primitive site, which includes the use of a wedge and gravel access road (similar to Bullfrog), would be located within the developed area (figure 22).

ALTERNATIVE C

Alternative C retains many of the components of alternative B, with some additional changes in location, type, or size of facilities, as well as some improvements and upgrades. Changes under alternative C include consolidation of the Halls Crossing campground and RV park, addition

of an amphitheater in the consolidated campground, relocation of shower and laundry facilities to the campground, addition of a combined land-based visitor contact / ranger station and emergency facilities building at Halls Crossing, relocation of the Bullfrog NPS maintenance facility, an increase in wet moorage, expansion of launch ramps, and supplementation of electric power with solar or fuel-cell technology.

The following sections describe in detail the changes proposed under alternative C that are both different from alternative A and different from alternative B. The location of facilities under alternative C for Bullfrog, Halls Crossing, and Hite are included in figures 24, 25, and 26, respectively. Table 1 contains a summary of the changes under alternative C. Table 2 contains changes in disturbed area acreages as a result of alternatives A, B, and C. Table 5 provides a comparison of the alternatives with the project objectives.

Facilities that would not change from existing conditions as a result of alternative C are not discussed in detail in the following sections. Those facilities that would remain unchanged from existing conditions (no-action alternative), including routine maintenance and repairs, are as follows:

- Bullfrog day-use facilities
- Bullfrog and Hite visitor contact / ranger station and emergency facilities
- concessioner boat maintenance and repair and property maintenance facility at Hite
- NPS maintenance facilities at Halls Crossing and Hite
- Halls Crossing and Hite fee collection systems
- airstrips at Bullfrog and Hite
- Hite Marina facilities
- water-based stores at Bullfrog, Halls Crossing, and Hite
- Hite launch ramp
- launch ramp support at Bullfrog and Halls Crossing
- river runner takeout at Hite

In addition, a number of items in alternative B are also common to alternative C. Those items common to alternatives B and C include the following:

- employee, concessioner, and partner housing at Bullfrog, Halls Crossing, and Hite
- visitor overnight accommodations at Bullfrog, Halls Crossing, and Hite
- Bullfrog and Hite visitor camping
- Bullfrog and Hite shower and laundry facilities
- land-based store at Bullfrog and Hite
- land-based food service at Bullfrog, Halls Crossing, and Hite
- day-use facilities at Bullfrog, Halls Crossing, and Hite
- visitor contact / ranger station and emergency facilities at Bullfrog and Hite

- concessioner boat maintenance and repair and property maintenance facilities at Bullfrog, Halls Crossing, and Hite
- secured storage at Bullfrog, Halls Crossing, and Hite
- utility systems at Bullfrog, Halls Crossing, and Hite
- roads and parking at Bullfrog, Halls Crossing, and Hite
- fee collection at Bullfrog
- Bullfrog school
- public boat wash-down areas at Bullfrog, Halls Crossing, and Hite
- water-based food service at Bullfrog and Halls Crossing
- ferry service at Bullfrog and Halls Crossing

Visitor Camping

Under alternative C, the developed campground and RV park at Halls Crossing would be consolidated in the existing campground location. The combined campground and RV park would be expanded from 64 sites to up to 80 total sites with both hookup and nonhookup sites. A shower and laundry facility and amphitheater would be added. The RV waste disposal station would be upgraded.

Shower and Laundry Facilities

The existing shower facilities at the campground at Halls Crossing would be upgraded to include shower and laundry facilities and the shower and laundry facilities at the Village Center would be eliminated.

Land-Based Stores

The land-based store at Halls Crossing would be upgraded by replacing it with a larger building. The new building would provide adequate storage for supplies. A small café or snack bar would also be added in the expanded building. The fuel station area would be regraded and the pavement replaced to eliminate uneven areas.

Ranger Station / Visitor Contact Station and Emergency Facilities

A land-based combined visitor services / ranger station and emergency services building would be constructed at Halls Crossing, in association with the campground or Village Center that would serve as a visitor center, fire station, provide storage for emergency service and search and rescue equipment, and include several ranger offices.

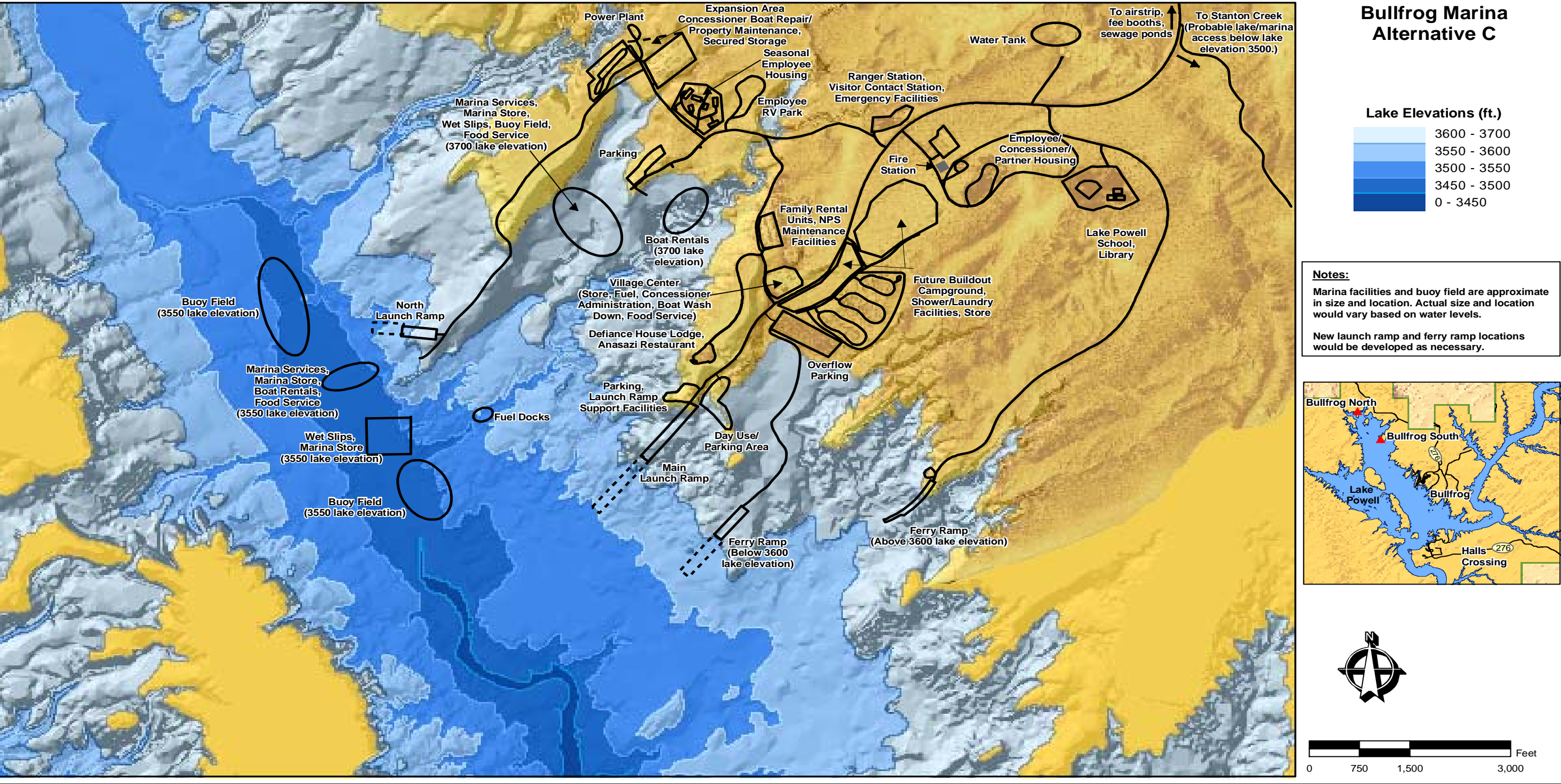


FIGURE 24. BULLFROG MARINA: ALTERNATIVE C

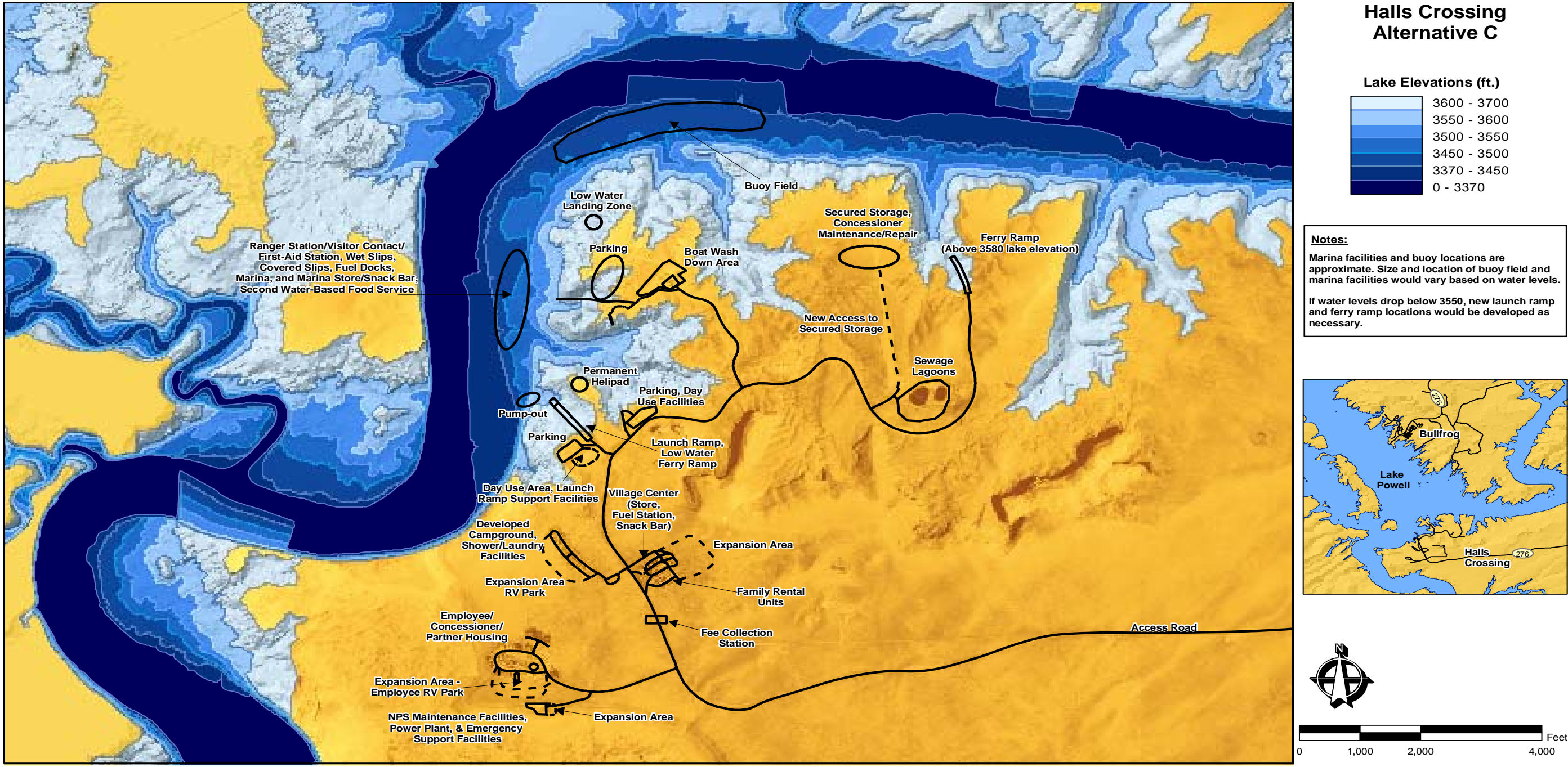


FIGURE 25. HALLS CROSSING MARINA: ALTERNATIVE C

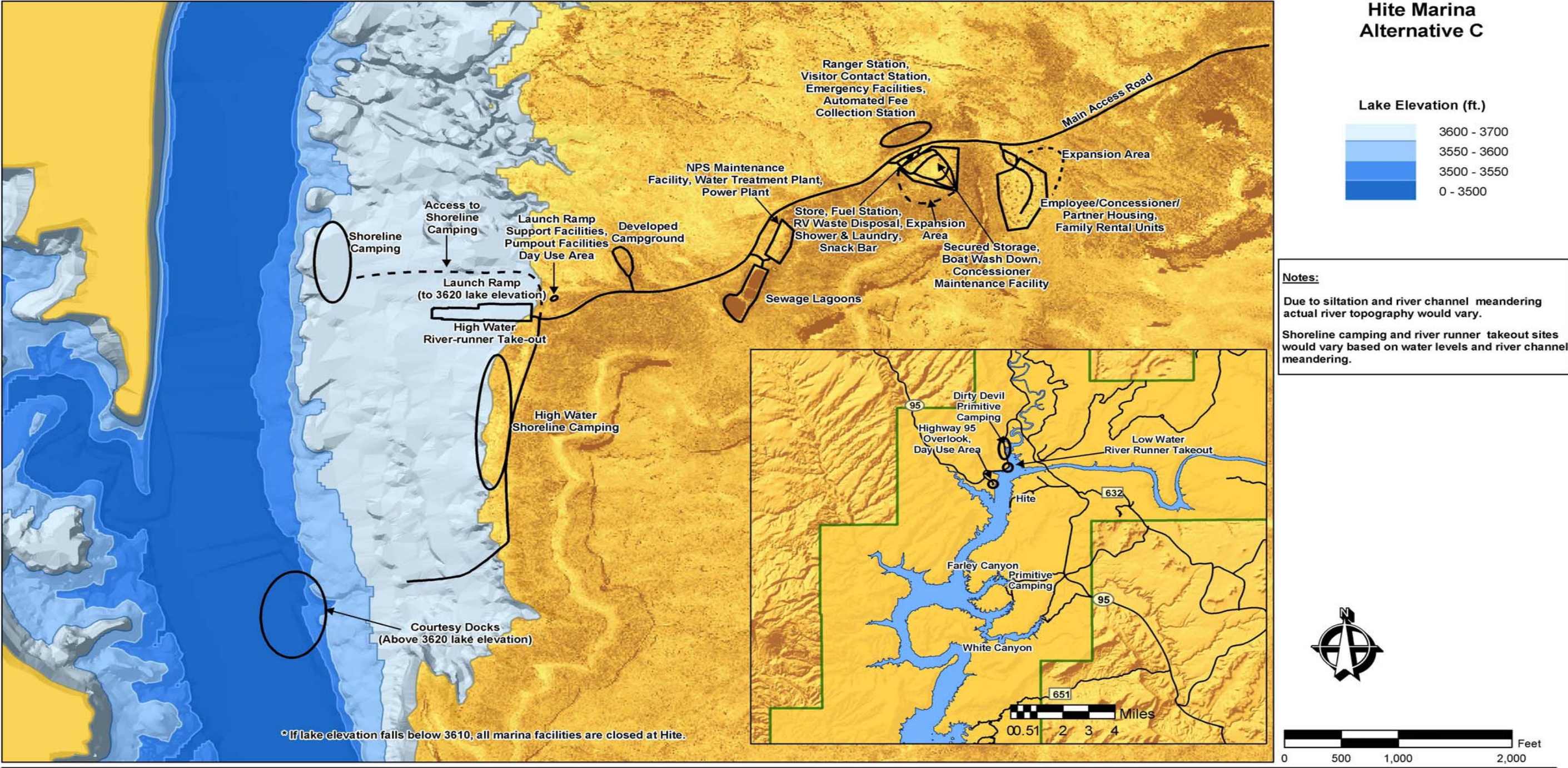


FIGURE 26. HITE MARINA: ALTERNATIVE C

National Park Service Maintenance Facilities

Under alternative C, the NPS maintenance area at Bullfrog would be moved to a less visible location behind the family rental units. Construction would include screening to improve the visual aesthetics of the maintenance facilities.

Marina Facilities

Under alternative C, the total combined moorage for Bullfrog and Halls Crossing would increase from the existing 1,090 spaces, up to 1,201 spaces. Additional spaces would be available for up to a 55-mooring buoy field and up to a 56-mooring slip area. The rental boat fleet would be allowed to expand up to a combined total of 580 boats. The concessioner, in conjunction with the National Park Service, would determine how to allocate this total between the two sites based on customer preference, season, water level, navigation impediments, and other factors. The existing water-based facilities at Halls Crossing would be upgraded under alternative C to include a fishing dock. There would be no change to the other marina services at Bullfrog and Halls Crossing under alternative C. The marina facilities would continue to be relocated within the development boundary, as necessary, in response to changing water levels.

Public Boat Launch Capabilities

Under alternative C, the National Park Service would continue to respond to changing water levels, as necessary, to maintain launching at Bullfrog and Halls Crossing. Under alternative C, the existing Bullfrog launch ramp would be maintained at its current width (ranging from 80- to 150-feet wide). Any new additional length needed to reach lower water levels would be constructed up to 150-feet wide, based on layout and landform constraints. If the existing launch ramp becomes unusable due to extreme low water, a new launch ramp of no more than 150-feet wide would be constructed within the developed area (figure 24), which would require additional environmental evaluation at that time. The existing launch ramp at Halls Crossing would be maintained at its current configuration. Any additional length necessary to reach low water would be up to 110 feet in width, based on layout and landform constraints.

Launch Ramp Support Facilities

Under alternative C, all launch ramp support facilities would be the same as the existing facilities, except at Hite a land-based boat pump-out facility would be constructed at the top of the launch ramp in the area of the fish cleaning station and shade shelter.

COMPARISON TO PROJECT OBJECTIVES

Six project objectives outlined in the purpose and need section of this document provide benchmarks for measuring the ability of each alternative to meet the purpose and need of the

project. Alternatives B (the preferred alternative) and C would achieve the six project objectives, while alternative A would not completely meet all six project objectives. A comparison of alternatives and planning objectives is illustrated in table 5.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

In accordance with Director's Order – 12, the National Park Service is required to identify the “environmentally preferred alternative” in all environmental documents, including environmental assessments. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the Council on Environmental Quality. The Council on Environmental Quality provides direction that “[t]he environmentally preferred alternative is the alternative that will promote the national environmental policy as expressed in section 101 of NEPA, which considers the following criteria:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings.
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice.
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of non-renewable resources” (NEPA, section 101).

Alternative A (no-action alternative) represents the current status of the uptake developed areas and would permit no modification from the existing conditions to address anticipated changes in visitor numbers and expectations, or relocation of facilities to accommodate changing lake elevations. In addition, existing facilities in less-than-ideal locations would continue to adversely affect the visitor experience, operational efficiency, and overall visual quality. Alternative A (no-action alternative) meets criterion 1 because it would not result in any expansion that could degrade the environment. Criteria 2 and 3 are not met by alternative A (no-action alternative) because locations of existing developments adversely impact overall visual quality. Because no expansion would be provided under alternative A (no-action alternative), criterion 4 is met because natural and cultural resources would not be adversely impacted by lack of action and would continue to be preserved. Criterion 5 would not be met by alternative A (no-action alternative) because visitation is projected to return to pre-drought levels (if not increase above them), further impacting congested facilities and limiting the variety of services offered. Criterion 6 would also not be met by alternative A (no-action alternative) because there are no provisions under this alternative for expanded use of technology to enhance the quality of renewable resources.

TABLE 5. COMPARISON WITH PROJECT OBJECTIVES

Project Objectives	Alternative A (no action)	Alternative B (preferred alternative)	Alternative C
1. Continue to provide visitor access to the uplake areas and tributaries.	Partially Meets Objectives. The existing launch ramps provide limited access, and in some cases, do not provide access to the lake at lower lake elevations.	Meets Objectives. Launch ramps would be lengthened, and in some cases, constructed in new locations in order to provide access to the lake at lower lake elevations.	Meets Objectives. Launch ramps would be constructed at maximum widths, in addition to being lengthened, and in some cases, constructed in new locations in order to provide access to the lake at lower lake elevations.
2. Provide opportunities for a variety of visitor experiences at the uplake areas.	Partially Meets Objectives. Campgrounds, restaurants, and stores would remain in their present configurations and locations. Some variety in terms of stores and restaurants is available. Campgrounds offer limited experiences as campgrounds cannot accommodate a variety of sizes of vehicles and there are no group camping facilities. Day-use facilities are limited.	Meets Objectives. Stores and restaurants would be expanded and/or new facilities constructed, increasing the variety of experience available to visitors. Campgrounds would be expanded to accommodate a variety of vehicles and offer a variety of camping experiences including group camping. The number of day-use facilities would be increased.	Meets Objectives. Same as alternative B.
3. Provide necessary and appropriate visitor services at the uplake areas, consistent with current and anticipated visitation.	Partially Meets Objectives. Occupancy rates for some facilities in some locations demonstrate that use of certain facilities is already maximized at reduced visitation levels.	Meets Objectives. Visitor services (numbers of buoys, lodging units, stores, restaurants, secured storage spaces, boat wash-down areas, and campsites with and without hookups) would be expanded to provide increased levels and expanded variety of necessary and appropriate services at the uplake areas.	Meets Objectives. Visitor services, in addition to those listed under alternative B (numbers of slips, land base pumpouts, amphitheaters, and ranger contact stations), would be expanded to provide increased levels and expanded variety of necessary and appropriate services at the uplake areas.
4. Accentuate different types of services at each developed area.	Does Not Meet Objectives. All developments would continue to offer similar services.	Meets Objectives. Development in the Hite area would focus more on river runner and backcountry use, and less on water-based services. Allocation of slip, buoy, and boat rental between Bullfrog and Halls Crossing would be flexible.	Meets Objectives. Same as alternative B.
5. Design facilities and services within uplake developed areas to accommodate fluctuating lake levels.	Partially Meets Objectives. Existing facilities (such as launch ramps, parking areas, and roads) have been extended to accommodate lower lake levels, but may not fully accommodate future lake level fluctuations.	Meets Objectives. Launch ramps, roads, and parking areas would continue to be extended, and sometimes constructed in new locations to provide visitor access at lower lake levels.	Meets Objectives. Same as alternative B.
6. Guide efficient and effective organization within uplake developed areas.	Does Not Meet Objectives. No changes would be made to current organization or location of facilities within the uplake developed areas.	Meets Objectives. Like uses would be consolidated in one location and facilities relocated to allow for effective and efficient organization.	Meets Objectives. Same as alternative B.

Alternative B (preferred alternative) represents the environmentally preferred alternative. Criteria 1 and 4 would be met under alternative B through mitigation measures that would reduce or eliminate environmental impacts resulting from increased development. Alternative B would relocate facilities to improve the visitor experience, operational efficiency, and visual quality, which would meet criteria 2 and 3. Additional visitor facilities such as visitor accommodations, camping facilities, food service facilities, visitor use areas, and marina facilities would also improve the visitor experience, meeting criterion 3. Alternative B would meet criterion 5 by increasing the amenities available to visitors while protecting the environment. Alternative B would also meet criterion 6 through expanded use of renewable energy sources for the uplake developed areas.

Alternative C includes many of the same elements as alternative B, but provides some additional changes and relocations. Changes and relocations under alternative C include consolidating the Halls Crossing RV park and campground sites at the campground location, addition of a land-based visitor / ranger contact station, and relocation of NPS maintenance facilities at Bullfrog to a less congested and visible location. These changes would improve the visitor experience, operational efficiency, and visual quality resulting in criteria 1, 3, and 4 being met. However, many of the changes would use limited resources without realizing the maximum attainable recycling and reuse. This would result in criteria 2 and 6 only partially being met under alternative C. Alternative C would not maximize the balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities because of the scale of the increased development, resulting in criterion 5 only partially being met. By making some of the changes in alternative C, such as moving the NPS maintenance facility, the resources used outweigh the benefits of the move.

Table 6 summarizes fulfillment of NEPA criteria for the environmentally preferred alternative for each alternative.

**TABLE 6. COMPARISON OF ABILITY TO MEET
NEPA CRITERIA FOR EACH ALTERNATIVE**

Criteria	Alternative A (no action)	Alternative B (preferred alternative)	Alternative C
1	Yes	Yes	Yes
2	No	Yes	Partially
3	No	Yes	Yes
4	Yes	Yes	Yes
5	No	Yes	Partially
6	No	Yes	Partially

ALTERNATIVES CONSIDERED BUT DISMISSED

Several combinations of alternatives were considered and dismissed. At Hite, various alternatives for continuing to launch boats at lower water levels were examined, including dredging a channel to provide boat access to the river channel or lake, hoisting large boats into the river channel, and establishing a launch ramp at Blue Notch, Farley Canyon, or White Canyon to access the upper reaches of the lake. All of these alternatives were considered cost prohibitive and would result in unacceptable impacts to natural resources.

Alternatives to the locations for various facilities were evaluated in all uplake developed areas; however, the facility locations presented in the action alternatives represent optimization of operational efficiencies. Alternatives to the size of various facilities were also evaluated; however, the facility sizes presented in the action alternatives represent the balance between providing adequate visitor services based on current and expected future visitation, and protecting natural and cultural resources.

COSTS OF ALTERNATIVES

A cost comparison in the form of a class C cost estimate of each of the action alternatives is included as appendix B. Industry refers to these estimates as conceptual or order-of-magnitude estimates. A class C estimate is a conceptual cost estimate based on square-foot cost of similar construction. These estimates are generally prepared without a fully defined scope of work and have an accuracy range of -30% to +50%.

MITIGATION MEASURES

To minimize resource impacts, the following mitigation measures would be followed during implementation of either action alternative. These mitigation measures are included in the analysis of impacts for each action alternative. The mitigation measures were developed to lessen potential adverse effects of the action.

General Considerations

- The National Park Service project manager would ensure that each project remains confined within the parameters established in the compliance documents and that mitigation measures are properly implemented.
- Construction zones would be identified and flagged before beginning the activity, and all disturbance would be confined to the flagged areas. All project personnel would be instructed that their activities must be confined to locations within flagged areas. Disturbance beyond the actual construction zone would be prohibited.

TABLE 7. SUMMARY AND COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A (no action)	Alternative B (preferred alternative)	Alternative C
Land Use	Because the existing uses conform to the land-use descriptions, and no changes would be made under the no-action alternative, there would be no impacts to land use under alternative A.	All proposed expansion and development would be consistent with the land-use descriptions in the 1979 GMP; therefore, there would be no impacts to land use.	
Soils and Geology	There would be no impacts to geology. The impacts to soils would continue to be long term, minor, and adverse.	Impacts to geology would be localized, short and long term, minor, and adverse. Overall impacts to soils would be long term, minor, and adverse.	
Paleontology	There would be no impacts to paleontology.	Impacts to paleontology would be localized, long term, negligible to minor, and adverse.	
Air Quality	The impacts to air quality would continue to be short and long term, minor, and adverse.	Impacts to air quality would be short term, minor, and adverse, and long term, minor to moderate, and adverse.	The use of supplemental power systems with solar or fuel-cell technology under alternative C would decrease in air emissions resulting in short-term, minor, and adverse, and long-term, negligible to minor, adverse impacts to air quality.
Water Resources	Overall water quality in the developed areas is adequately controlled through existing facilities and programs. As a result, the no-action alternative would continue to result in long-term negligible impacts to water quality.	Impacts to water quality would be short term, negligible, and adverse from runoff during construction. Long-term, minor, adverse impacts on surface water quality would occur from continued recreational uses, including potential leaks and spillage of boat fuels and continued use of watercraft. No violations of water quality standards would be expected.	
Waters of the U.S. including Wetlands	There would be no changes to existing conditions under the no-action alternative and therefore no impacts to wetlands.	Impacts to waters of the United States would be expected to be short and long term, negligible, and adverse. There would only be negligible impacts to wetlands.	
Floodplains	Under the no-action alternative, there would be no impacts to floodplains because new construction or expansion of existing operations would not occur.	Impacts to floodplains would be expected to be short and long term, negligible, and adverse.	
Vegetation	Overall impacts to vegetation of the uplake developed areas under the no-action alternative would be long term, minor to moderate, and adverse, resulting from facility and infrastructure maintenance, increased visitation, and introductions of nonnative plant species.	Overall impacts to vegetation would be long term, moderate, and adverse, resulting primarily from facility and infrastructure construction, more intense development of primitive campsites, and long term, negligible, and beneficial due to restoration of previously disturbed plant communities.	

TABLE 7. SUMMARY AND COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A (no action)	Alternative B (preferred alternative)	Alternative C
Wildlife	Existing impacts to wildlife in the developed areas are long term, minor, and adverse.	Impacts to wildlife species and habitat would be short and long term, minor, and adverse.	
Threatened and Endangered Species and Species of Concern / Designated Critical Habitat	Impacts from the no-action alternative would continue to be long term, localized, minor, and adverse.	The short- and long-term impacts would be minor and adverse.	
Visual Resources	Existing impacts to visual resources from facilities that visually detract from busy visitor use areas would continue to be long term, minor, and adverse.	Short-term, negligible to minor, adverse impacts to visual resources would result from construction activities. Overall long-term impacts under this alternative would be minor and beneficial due to the positive effects of relocating certain facilities outside visitor viewscales and reclaiming previously developed areas.	
Soundscapes	Impacts would vary seasonally and would be long term, localized, and adverse, and range from negligible to minor depending on the season of activity.	The short-term impacts to soundscapes from construction activities as a result of implementation of the alternative would be negligible to moderate and adverse. The long-term impacts to soundscapes as a result of human-caused sound from the implementation of the alternative would vary seasonally and be negligible to moderate and adverse.	
Archeological Resources	Localized archeological resource impacts from visitor use and NRA operations would be long term, adverse, and range from negligible to minor.	Archeological resource impacts would be long term, adverse, and range from negligible to minor.	
Ethnographic Resources	Ethnographic resource impacts related to visitor use would be long term, adverse, and negligible to minor in the developed areas. Impacts from NRA operations would have long-term, minor, adverse impacts.	With mitigation, impacts to ethnographic resources would be resource-specific and long term and would range from negligible to minor.	
Visitor Use and Experience	Overall impacts to visitor use and experience from the no-action alternative would be long term, minor to moderate, and adverse, and result from the lack of increases in visitor services as visitor numbers increase, and the aging of visitor accommodations.	Short-term impacts to visitor use and experience as a result of activities associated with expansion, relocation, or construction of facilities at the uplake areas would be minor and adverse. Long-term impacts to visitor use and experience would be minor and beneficial.	Short-term impacts to visitor use and experience as a result of activities associated with expansion, relocation, or construction of facilities at the uplake areas would be minor and adverse. Long-term impacts to visitor use and experience would be minor to moderate and beneficial.

TABLE 7. SUMMARY AND COMPARISON OF POTENTIAL ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A (no action)	Alternative B (preferred alternative)	Alternative C
Socioeconomic Environment	Under alternative A, impacts to the economy and local government fiscal conditions in towns near the uplake developed areas and associated counties would be negligible to minor, long term, and adverse. Where effects to visitor use are greatest, impacts to the economy and to local government fiscal conditions would be long term, minor, and adverse.	Impacts to socioeconomics from planned construction projects as part of the alternatives would be short term, minor, and beneficial. The benefits to concessioners and to visitor-related business and public revenue would be long term, minor to moderate, and beneficial.	
Park Operations	Overall impacts to NRA operations from alternative A would be long term, minor, and adverse from meeting the ongoing maintenance needs of aging facilities and increased demands as a result of increased visitation.	Overall short-term, negligible to minor, adverse impacts would occur to NRA operations from construction activities; long-term, minor, and adverse impacts would result from increased operational demands from facility expansion; and long-term, minor, beneficial impacts to NRA operations would result from reduced maintenance and repair requirements for upgraded facilities.	
Public Health and Safety	Because no changes would occur to existing facilities at the uplake developed areas under the no-action alternative, there would be no impacts to health and safety.	Impacts to health and safety would be short term, negligible, and adverse, and long term, negligible to minor, and beneficial.	Impacts to health and safety would be short term, negligible, and adverse, and long-term, minor, and beneficial.
Transportation	Because no changes would be made under the no-action alternative, there would be no impacts to transportation under alternative A.	The overall impacts to transportation would be short term, minor, and adverse resulting from increased traffic and congestion during construction periods; and long-term, minor, and beneficial impacts resulting from consolidation of like activities, centrally locating facilities to reduce traffic, and improved circulation patterns.	

- All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone, as defined by the construction zone flagging. This does not exclude necessary temporary structures such as erosion-control fencing.
- All tools, equipment, barricades, signs, and surplus materials would be removed from the project work limits upon project completion. Rubbish would be routinely removed from the project site. Any asphalt or concrete surfaces damaged due to work on the project would be repaired to original condition. All demolition debris would be removed from the project site.
- Staging for a construction office, construction vehicles and equipment, and materials storage would be located in previously disturbed areas, outside of high visitor use areas, and would be clearly identified in advance. All staging areas would be returned to pre-construction conditions once construction is complete.
- Contractors would be given orientation concerning proper conduct of operations. This orientation is provided in both written form and verbally at a preconstruction meeting. Orientation topics would include (and not limited to) the following:
 - Wildlife should not be approached or fed.
 - Collecting any park resources, including plants, animals, and historic or prehistoric materials, is prohibited.
 - Contractor must have a safety policy in place and follow it.
 - A vehicle fuel leakage and spill plan would be developed and implemented for the project prior to construction.
 - Other environmental concerns and requirements discussed elsewhere in this EA would be addressed, including relevant mitigation measures listed below.

Sediment Control

- Utah Department of Environmental Quality requirements, industry standards, and best management practices (BMPs) for drainage and sediment control would be implemented to prevent and/or control nonpoint source discharge to minimize soil loss and sedimentation in drainage areas. Use of BMPs for drainage area protection would include all or some of the following actions, depending on site-specific requirements:
 - Keep disturbed areas as small as practical to minimize exposed soil and the potential for erosion.
 - Locate waste and excess excavated materials outside of drainages to avoid sedimentation.
 - Install silt fences, temporary earthen berms, water bars, sediment traps, check dams, or other equivalent measures to control runoff, as necessary, prior to construction.

- Conduct regular site inspections during the construction period to ensure that erosion-control measures are properly installed and are functioning effectively.
- Store, use, and dispose of chemicals, fuels, and other toxic materials in the required and appropriate manner.
- Revegetate disturbed areas as soon as possible after construction is completed.

Soils

- Trenching grading operations using manual or heavy equipment would follow industry standard stabilization methods. After trenching and grading is completed, backfill, compaction and regrading operations would be initiated as soon as possible to establish and maintain stable soil surfaces. Soil surfaces would be treated and restoration within approved NPS guidelines and specifications would be performed.
- Vehicle or equipment tracks would be eradicated and “raked out” after construction activities to reduce visual impact and reduce the possibility of visitors driving through soil-disturbed areas.
- Dust and soil control measures, including surface water spraying and revegetation using hydro mulch, would be incorporated into construction activities to reduce soil loss from wind erosion.

Paleontology

If previously unknown paleontological resources are discovered during construction activities, all work in the immediate area of the discovery would cease until the resources could be identified and documented. If paleontological sites are discovered and cannot be avoided, the resource would be recorded and recovered using required compliance processes.

Air Quality

- To reduce dust and fine particles from becoming airborne during construction activities, truck beds would be covered with tarps.
- To reduce tailpipe emissions, construction equipment would not be left idling any longer than is required for safety and mechanical operations.
- To reduce short-term construction dust, water sprinkling would be applied to problem areas. Construction limits would be established to minimize soil disturbance and blowing dust.
- Landscaping and revegetation would control long-term soil erosion and blowing dust. Mulch and plants would be used to stabilize the soil and reduce wind impacts across open areas where required.

Water Resources

- A stormwater management plan would be developed in compliance with Utah Department of Environmental Quality requirements. Additional permitting would be managed to comply with mitigation measures required by state and federal water quality and pollution prevention regulations.
- All activities and projects that occur below 3,700 feet (amsl) would adhere to the requirements of the USACE general lakewide permit, as required by section 404 of the Clean Water Act, and section 10 of the Rivers and Harbor Act.
- Measures from a hazardous spill plan would be in place and dictate preventive measures and required actions taken in the case of a hazardous materials spill.
- All equipment used within the NRA for operations and construction would be maintained in a clean and well-functioning condition to avoid leaks and contamination of resources from mechanical and automotive fluids.

Floodplains

Appropriate state and federal regulatory permits and protection measures would be established prior to the start of any new construction projects.

Vegetation

- In an effort to avoid introduction of nonnative/noxious plant species, imported topsoil would be certified free of weed seed contaminants.
- Most areas of new disturbance would be returned to native vegetation through revegetation or seeding. Natural restoration may be used, when appropriate and viable, based on seasonal rain patterns.
- Reclaimed areas would be monitored after construction to determine if revegetation efforts are successful with follow-up actions, as needed.
- Reclamation measures may include installation of erosion-control structures and reseeding with hydro-mulch stabilization.
- To avoid the introduction of nonnative plant species, hay bales would be limited in use because they often contain seeds of undesirable or harmful alien plant species. Straw wattles of appropriate plant species would be used to control soil erosion wherever possible. Application of NPS guidelines for noxious weed control measures would be incorporated into construction activities.

- Undesirable plant species would be controlled, as necessary. To prevent the introduction and minimize the spread of nonnative vegetation and noxious weeds, the following measures would be implemented during construction:
 - Minimize soil disturbance.
 - Pressure wash and/or steam clean all construction equipment to ensure that all equipment, machinery, rocks, gravel, or other materials are cleaned and weed free before entering Glen Canyon NRA.
 - Cover all haul trucks bringing asphalt or other fill materials from outside the recreation area to prevent seed transport.
 - Limit vehicle parking to existing disturbed areas where possible.
 - Obtain all fill, rock, or additional topsoil from the project area, if possible. If not possible, obtaining weed-free sources from NPS-approved sources outside the recreation area, as required.
 - Initiate restoration of disturbed sites immediately following construction activities.
 - Monitor disturbed areas following construction to identify growth of noxious weeds or nonnative vegetation. Treatment of nonnative vegetation would be completed in accordance with NPS – 13, *Integrated Pest Management Guidelines* and/or the Glen Canyon Integrated Pest Management Plan, which will be completed in 2006.

Threatened and Endangered Species / State Species of Concern

Mitigation for impacts to threatened and endangered species and their designated critical habitat is based on consultation with the USFWS under section 7 of the Endangered Species Act, and includes:

- Access road, restroom placement, and any other incidental actions needed to develop the Hite shoreline camping area would occur outside the southwestern willow flycatcher breeding season.
- Use of the camping area would be restricted to the nonbreeding season for the southwestern willow flycatcher during low lake levels. These restrictions would be lifted should lake levels increase and inundate the habitat area. As the water rises and falls, the shoreline camping area would be adjusted accordingly.

Mitigation measures for Utah state species of concern would include:

- Mitigate for any impacts to bat species – all impacted buildings would be surveyed for bats prior to demolition or construction. Any bats found would be relocated per Utah Department of Natural Resource guidelines.
- Mitigation for the chuckwalla and the glossy snake would consist of surveys for species presence prior to disturbance, which may include relocation of detected individuals

per Utah Department of Natural Resource guidelines, to prevent direct impacts from construction.

- Burrowing owl surveys would be completed and if found, will be relocated to artificial burrows away from construction areas.

Visual Resources

Trenching for underground utilities would be limited to a 10-foot-wide fenced construction zone, if possible.

- All new construction would be consistent with established architectural themes and construction materials would complement natural colors and textures.
- The new stacked storage unit proposed for the Bullfrog secured storage area would be located outside the primary viewshed and would blend into the natural landscape.
- Overall, muted natural colors would be used to blend any human-made surfaces with the landscape.

Soundscapes

- Contractors would be required to properly maintain construction equipment (i.e., mufflers) to minimize noise.
- Noise-generating construction activities would be limited to approved hours of operation to minimize visitor impacts.

Archeological Resources

- Prior to implementation of any undertakings (actions), a SHPO file search would be conducted to determine the location of any existing historic or prehistoric resources. As necessary, an appropriate level of survey and/or data recovery would be completed before work begins. In the unlikely event that unknown archeological resources would be uncovered during construction, work would be halted in the discovery area, the site secured, and Glen Canyon NRA staff experts would consult according to 36 CFR 800.13 and, as appropriate, provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA).
- In compliance with NAGPRA, the National Park Service would notify and consult concerned American Indian tribal representatives for the proper treatment of human remains, funerary, and sacred objects should these be discovered during the project.
- Archeological monitoring would be established on-site during any ground-disturbing activities in areas identified as culturally sensitive.

- Archeological specimens found within the construction area would only be removed by NPS archeologists or their designated representatives.

Visitor Use and Experience

- The recreation area may restrict construction activities during peak use hours/days, such as holidays and weekends, to minimize disruption to visitors.
- Facilities that are relocated or are temporarily closed due to construction work would be signed with information on the location of the nearest similar facility or location for assistance.
- Unless otherwise approved by the National Park Service, construction operations would be restricted to the hours of 8:00 a.m. to 6:00 p.m. during the summer (May 1 through September 30), and 9:00 a.m. to 5:00 p.m. during the rest of the year to reduce visitor impacts.
- Information regarding construction projects or activities would be shared with the public upon entrance into the recreation area, or through other methods of informational distribution such as informational brochures, flyers, press releases, mailings, and Web sites.
- Management strategies to address carrying capacity issues at various water levels would target better distribution of launch activities throughout a 24-hour day. Methods to reduce launch backup may include broadcasts of real-time launch ramp conditions using the recreation area information radio system, on-site NPS staff visitor contacts, Web site postings, or a launch-time reservation system.
- Methods to allocate visitor use of shoreline campsites may include a camping reservation system to reduce impacts to specific visitor use zones and coordinate length of stay to further address carrying capacity issues.
- The existing “trash tracker” program is well established and incorporates volunteer houseboat trips to clean up beaches. Additionally, visitor education promoting responsible behavior and awareness of water quality and pollution issues are offered through NPS and concessioner visitor contacts, brochures, on-site programs, and Web site information. Trash bags are also made available to visitors at no charge in support of the “pack it in / pack it out” program. These combined mitigations substantially reduce the adverse impacts of litter on beaches and in the lake.

Park Operations

- Concessions would be notified at least 24 hours in advance of temporary utility outages and construction work within their land assignments.

- Whenever possible, length of outages would be kept to a minimum and scheduled on nonpeak usage hours to reduce economic impacts on concessions and visitor inconvenience.

Public Health and Safety

A safety plan for project work in drainages and washes would be formulated and implemented to protect public health and safety should these activities take place during the rainy season. Whenever possible, construction in floodplains and washes would be avoided during the rainy season.

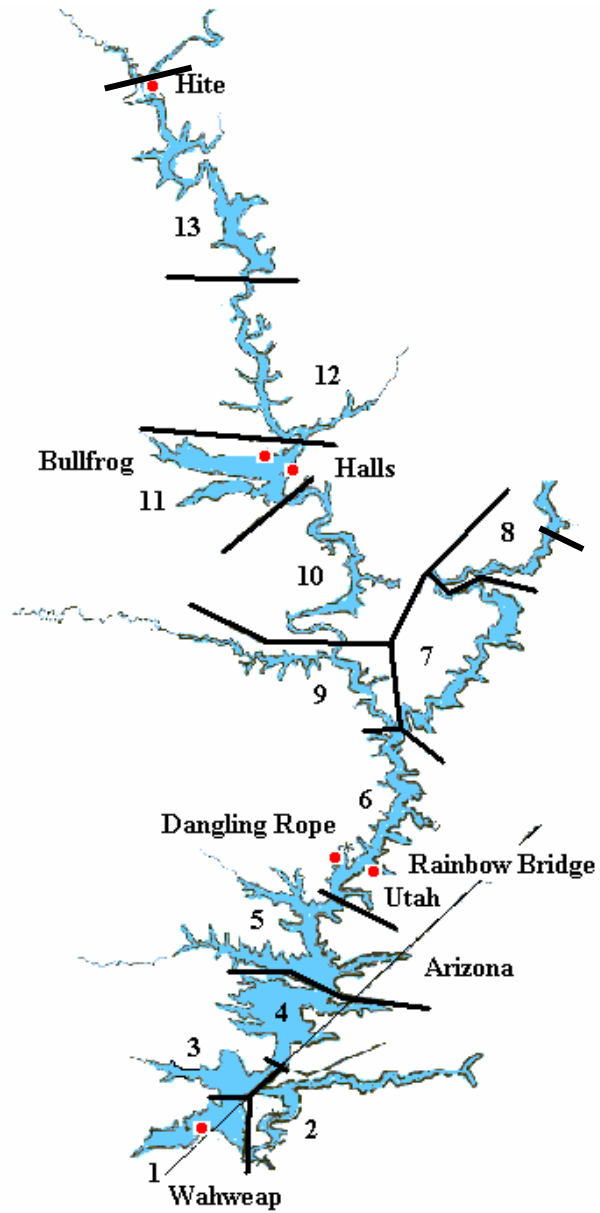
- All construction work in visitor use areas (parking lots, campgrounds, launch ramps, etc.) would be barricaded and signed in order to keep visitors at a safe distance from the construction zone.
- Based on the Occupational Safety and Health Administration (OSHA) and NPS patrol and construction management monitoring systems for land- and water-based safety, some construction areas in flash flood-prone areas may be closed to reduce public health and safety risks.
- Water activities on Lake Powell are regulated by U.S. Coast Guard and NPS regulations. Measures to manage concentrated visitor boating may include increased water patrols and designation of wakeless zones based on water surface reduction at lower lake levels. These measures would mitigate adverse impacts of increased boat density in specific visitor use zones.

Transportation

Traffic in any one direction would not be stopped for more than 20 minutes to minimize disruption of traffic flow.

SUPPLEMENTAL CALCULATIONS AND ANALYSIS FOR LAKE POWELL CARRYING CAPACITY

In 1987, a carrying capacity study was developed to quantify resource impacts and visitor distribution on Lake Powell during full pool conditions (+/- 3,680 to 3,700 feet amsl). For purposes of the study, Lake Powell was divided into 13 visitor use zones, which are identified in the GMP (figure 27). Impact factors were used to evaluate the relationship between visitor use areas and environmental impacts, such as shoreline pollution, water quality, availability of usable shoreline for recreation, boating safety, and visitor experience qualities, that contribute to recreational opportunities.



(zones 6 through 13 considered uplake area)

FIGURE 27. VISITOR USE ZONES

Due to ongoing drought conditions that have impacted lake levels at Lake Powell, the DCP planning process prompted the need to prepare supplemental calculations and analyze carrying capacity for lower lake levels in the uplake areas. To accomplish this effort, updated data from ongoing resource monitoring projects and recent visitor surveys were input into carrying capacity calculations using the same methodology as the 1987 study.

Two limiting factors from the 1987 study were eliminated from the supplemental calculations: water quality and shoreline impacts. These factors were not considered in the updated calculations due to successful mitigation measures implemented since the original study, resulting in reduced impacts. The remaining factors used to calculate new numbers for carrying capacity were applied to the physical capacity (shoreline availability), safety (density/distribution of boats on lake surface), and recreational quality (measuring visitor experience) while visiting Lake Powell.

A detailed summary of calculations and findings for the supplemental analysis are available on request from Glen Canyon NRA. Additional analysis of the supplemental carrying capacity calculations and a description of impacts that relate to the DCP/EA can be found in the “Environmental Consequences” section of this document.

Analysis of Carrying Capacity for Lake Powell

The concept of analyzing impacts based on limiting factors is flexible and can be used to produce quantifiable results to consider resource impacts, their causes, and potential management strategies for mitigation. Limiting factors serve as a screen to determine the most constraining issue to trigger management changes.

The limiting factors at each lake elevation interval under consideration in the supplemental calculations are presented in tables 8 through 11. Maximum boats-at-one-time (BAOT) indicates the maximum number of boats at one time in that particular zone to meet the limitation of that particular limiting factor.

The shaded blocks with numbers in brackets indicate the limiting factor that is the controlling consideration for each zone. As previously discussed, water quality has been determined to be nonlimiting based on water quality. Data evaluated since 1998, indicate that water quality is not a limiting factor due to education, monitoring studies, and practices implemented to control human waste.

TABLE 8. 2005 LIMITING FACTOR MATRIX LAKE ELEVATION 3,500

(Maximum Boats-At-One-Time)

Visitor Use Zone	Physical	Safety	Recreational Quality (Social)		
			Semi-Primitive	Rural / Natural	Urban / Natural
6	1,456	612	[459]	612	612
7	1,025	471	[353]	471	N/A
9	784	265	[199]	265	N/A
10	596	615	[461]	615	N/A
11	417	256	N/A	[192]	256
12	679	438	[329]	438	N/A
13	2,285	675	[506]	675	N/A

NA = The Recreational Opportunity Spectrum or ROS designation used in the 1987 study does not apply to this zone due to the concentration of marina facilities.

Shaded and bracketed numbers indicate the limiting factor for that particular zone at specific lake elevation.

TABLE 9. 2005 LIMITING FACTOR MATRIX LAKE ELEVATION 3,550

(Maximum Boats-At-One-Time)

Visitor Use Zone	Physical	Safety	Recreational Quality (Social)		
			Semi-Primitive	Rural / Natural	Urban / Natural
6	1,465	753	[565]	753	753
7	595	614	[460]	614	N/A
9	334	349	[261]	349	N/A
10	[394]	729	547	729	N/A
11	593	437	N/A	[328]	437
12	854	525	[394]	525	N/A
13	2,191	963	[722]	963	N/A

NA = The Recreational Opportunity Spectrum or ROS designation used in the 1987 study does not apply to this zone due to the concentration of marina facilities.

Shaded and bracketed numbers indicate the limiting factor for that particular zone at specific lake elevation.

TABLE 10. 2005 LIMITING FACTOR MATRIX LAKE ELEVATION 3,600

(Maximum Boats-At-One-Time)

Visitor Use Zone	Physical	Safety	Recreational Quality (Social)		
			Semi-Primitive	Rural / Natural	Urban / Natural
6	1,812	946	[710]	946	946
7	[537]	745	558	745	N/A
9	475	459	[344]	459	N/A
10	640	851	[639]	851	N/A
11	685	764	N/A	[573]	764
12	499	619	[465]	619	N/A
13	1,852	1,273	[955]	1,273	N/A

NA = The Recreational Opportunity Spectrum or ROS designation used in the 1987 study does not apply to this zone due to the concentration of marina facilities.

Shaded and bracketed numbers indicate the limiting factor for that particular zone at specific lake elevation.

TABLE 11. 2005 LIMITING FACTOR MATRIX LAKE ELEVATION 3,700

(Maximum Boats-At-One-Time)

Visitor Use Zone	Physical	Safety	Recreational Quality (Social)		
			Semi-Primitive	Rural / Natural	Urban / Natural
6	2,589	1,394	[1,045]	1,394	1,394
7	[779]	1,045	784	1,045	N/A
9	990	726	[544]	726	N/A
10	1,082	1,127	[846]	1,127	N/A
11	1,528	1,942	N/A	[1,456]	1,942
12	1,215	915	[686]	915	N/A
13	2,802	1,948	[1,461]	1,948	N/A

NA = The Recreational Opportunity Spectrum or ROS designation used in the 1987 study does not apply to this zone due to the concentration of marina facilities.

Shaded and bracketed numbers indicate the limiting factor for that particular zone at specific lake elevation.

The supplemental calculations in table 12 provide updated carrying capacity launch rates (CCLRs) at varying lake levels, and compare them with the existing capacity of launch and marina facilities to launch boats onto the lake.

Table 13 provides a comparison of 2005 carrying capacity launch rates with current capacity of existing marinas and launch ramps to distribute boats onto the lake. Columns of information should be compared between those with the same lake elevations. Shaded blocks with bracketed numbers in the current capacity columns indicate when the capacity exceeds the recommended CCLR for that lake elevation.

As shown in table 12, the carrying capacity limits for combined Bullfrog and Halls Crossing areas may be exceeded based on limiting factors if maximum launch rates and boats from marinas put on the water at one time at the full pool lake elevation of 3,700. In addition, Halls Crossing existing carrying capacity may be exceeded at lake elevations of 3,550, 3,600, and 3,700 if maximum launch rates and boats from marinas put on the water at the same time.

The 1987 carrying capacity study and supplemental calculations assumed that 20% of boats in marina facilities would be out on the lake at any one time. Under alternative B, increases in wet moorage would increase total launches by 11 launches per day, and increases in rental boat fleets would increase total launches by 116 launches per day. Under alternative C, increases in wet moorage would increase total launches by 22 launches per day, and increases in rental boat fleets would increase total launches by 116 launches per day.

TABLE 12. CARRYING CAPACITY LAUNCH RATES / CURRENT CAPACITY COMPARISON TABLE

	<u>Updated Carrying Capacity Launch Rate</u> (calculated using 1987 methodology and updated data to evaluate varying lake levels)				<u>Current Capacity</u> (combines 20% of existing buoy moorage and ramp capacity at each lake level)				
	3,500 CCLR	3,550 CCLR	3,600 CCLR	3,700 CCLR	3,500	3,550	♦3,557– 3,583	3,600	3,700
Bullfrog	310	375	524	463	246	246	343	305	437
Halls Crossing	121	160	217	179	Unknown*	[223]	223	[275]	[266]
Bullfrog/Halls Crossing Combined	431	535	741	642	Unknown	469	566	580	[703]
Hite	0	0	0	377	N/A	N/A	N/A	N/A	210

* There is no launch capacity at the existing Halls Crossing launch ramp below 3,550 lake elevation.

**Numbers reflect a factor increase due to length of stay estimates from visitor survey information. Survey data suggests visitors stay twice as long at higher lake levels then at 3,600 and below lake levels.

♦ 3,557–3,583 lake levels shown due to launch capability of Bullfrog north ramp at those lake elevations.

For this planning effort, Bullfrog and Halls Crossing numbers are shown combined due to proximity of marinas within visitor use zone 11.

Table 13 compares updated carrying capacity launch rates with projected capacity to launch boats resulting from the implementation of alternative B. Varying lake level shoreline capacity, safety, and recreational quality factors are included in the updated carrying capacity launch rates. Alternative B adds 20% of proposed buoy moorage and increased rental boat fleet to the launch ramp capacity numbers. Shaded boxes with bracketed numbers highlight lake level projected capacities that may exceed carrying capacity if maximum numbers of launches occur within 24 hours.

The 1987 carrying capacity study and supplemental calculations assumed that 20% of boats in marina facilities would be out on the lake at any one time.

**TABLE 13. CARRYING CAPACITY LAUNCH RATES
(UPDATED CARRYING CAPACITY LIMITS COMPARED TO ALTERNATIVE B)**

Updated Carrying Capacity Launch Rate (calculated using 1987 methodology and updated data to evaluate varying lake levels)					Alternative B Projected Capacity (combines 20% of increased buoy moorage, rental boats and ramp capacity at each lake level)				
	3,500 CCLR	3,550 CCLR	3,600 CCLR	3,700** CCLR	3,500	3,550	◆3,557–3,583	3,600	3,700
Bullfrog	310	385	524	469	286	286	383	345	479
Halls Crossing	121	171	217	179	Unknown*	[274]	[274]	[326]	[326]
Bullfrog/Halls Crossing Combined	431	556	741	648	Unknown	560	657	671	[805]
Hite	0	0	0	377	N/A	N/A	N/A	N/A	219

* There is no launch capacity at the existing Halls Crossing launch ramp below 3,550 lake elevation.

**Numbers reflect a factor increase due to length of stay estimates from visitor survey information. Survey data suggests visitors stay twice as long at higher lake levels then at 3,600 and below lake levels.

◆ 3,557–3,583 lake levels shown due to launch capability of Bullfrog north ramp at those lake elevations.

For this planning effort, Bullfrog and Halls Crossing numbers are shown combined due to proximity of marinas within visitor use zone 11.

Table 14 compares updated carrying capacity launch rates with projected capacity resulting from the implementation of alternative C. Varying lake level shoreline capacity, safety, and recreational quality factors are included in the updated carrying capacity launch rates. Alternative C adds 20% of proposed wet slips, buoy moorage, and rental boat fleet increases into the launch ramp capacity numbers. Shaded boxes highlight lake levels and launch rates that may exceed carrying capacity if maximum numbers of launches occur within 24 hours.

**TABLE 14. CARRYING CAPACITY LAUNCH RATES, UPDATED CARRYING CAPACITY
COMPARED TO ALTERNATIVE C**

Updated Carrying Capacity Launch Rate (calculated using 1987 methodology and updated data to evaluate varying lake levels)					Alternative C Projected Capacity (combines 20% of increased buoy moorage & slip expansion, rental boats, and ramp capacity at each lake level)				
	3,500 CCLR	3,550 CCLR	3,600 CCLR	3,700 CCLR	3,500	3,550	◆3,557–3,583	3,600	3,700
Bullfrog	310	385	524	469	297	297	394	356	490
Halls Crossing	121	171	217	179	Unknown*	[274]	[274]	[326]	[326]

TABLE 14. CARRYING CAPACITY LAUNCH RATES, UPDATED CARRYING CAPACITY COMPARED TO ALTERNATIVE C

Updated Carrying Capacity Launch Rate (calculated using 1987 methodology and updated data to evaluate varying lake levels)					Alternative C Projected Capacity (combines 20% of increased buoy moorage & slip expansion, rental boats, and ramp capacity at each lake level)				
	3,500 CCLR	3,550 CCLR	3,600 CCLR	3,700 CCLR	3,500	3,550	♦3,557– 3,583	3,600	3,700
Bullfrog / Halls Crossing Combined	431	556	741	648	Unknown	[571]	668	682	[816]
Hite	0	0	0	377	N/A	N/A	N/A	N/A	219

* There is no launch capacity at the existing Halls Crossing launch ramp below 3,550 lake elevation.

**Numbers reflect a factor increase due to length of stay estimates from visitor survey information. Survey data suggests visitors stay twice as long at higher lake levels then at 3,600 and below lake levels.

♦ 3,557–3,583 lake levels shown due to launch capability of Bullfrog north ramp at those lake elevations.

For this planning effort, Bullfrog and Halls Crossing numbers are shown combined due to proximity of marinas within visitor use zone 11.

Widening the existing launch ramp sections to a maximum of 150-feet wide and construction of any future launch ramp sections to a maximum of 150-feet wide under alternative C would result in increased launch capacity at lower lake levels. Assumptions used in the supplemental calculations to the 1987 carrying capacity study included 24-hour ramp availability for launching/retrieving, 25-foot-wide launch lanes, and 15 minutes cycle time per launch. Using these assumptions, the capacity of the ramp to launch boats would increase by 134 launches per day at lake elevation 3,600, and 193 launches per day at lake elevations 3,550 and 3,500.

The updated calculations show management strategies may be needed to mitigate the resulting carrying capacity issues to address “physical capacity” and “recreational quality” factors. Some management actions that could mitigate the physical capacity issue include a reservation or permitting system to manage camping allocation in different zones, or regulating launch times and volume during peak demand.

Approaches to managing recreational quality factors may include providing information to visitors, prior to boating, about the characteristics and popularity of different visitor use zones to increase distribution and support a range of visitor experience opportunities as part of the Lake Powell recreational experience.