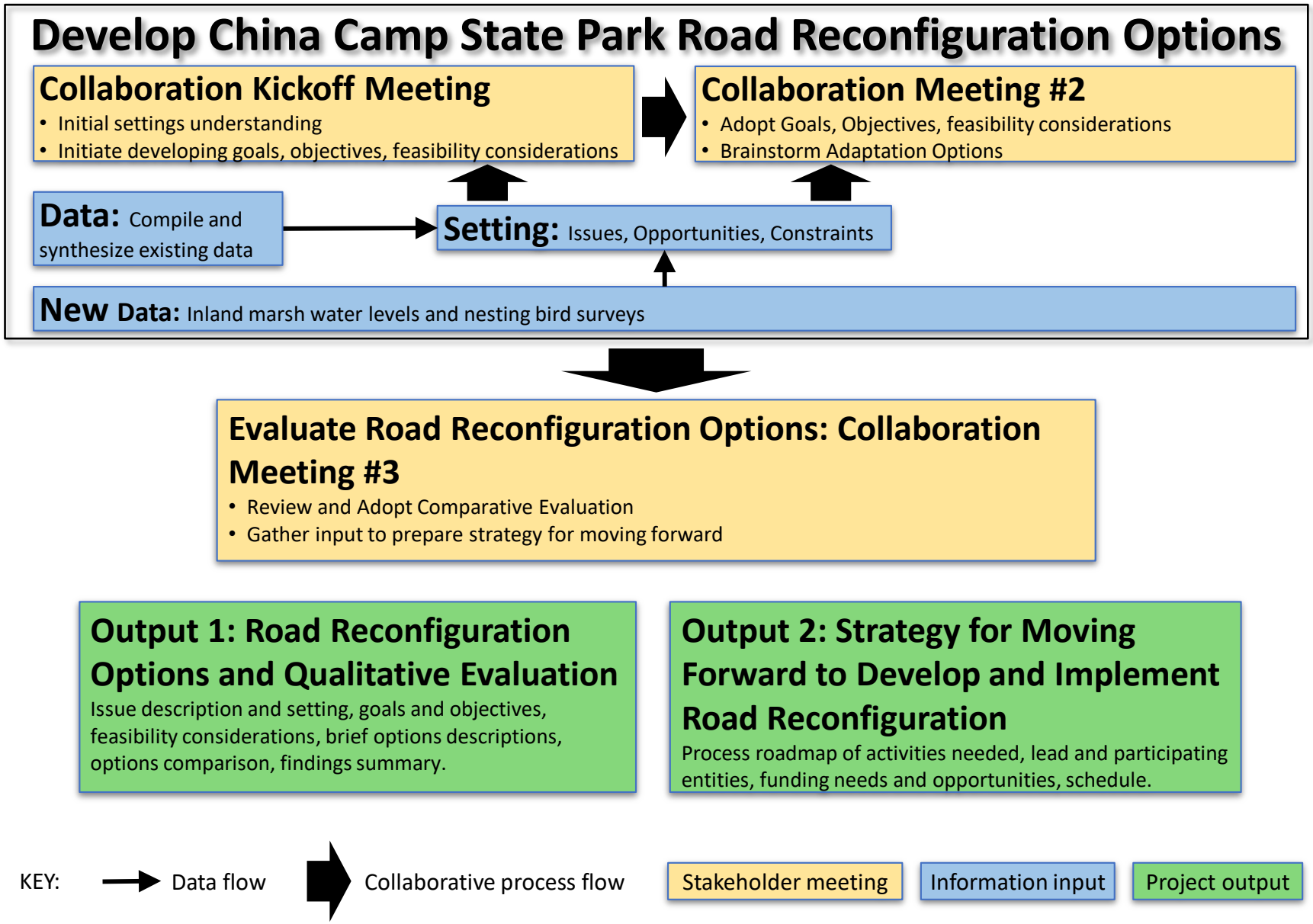
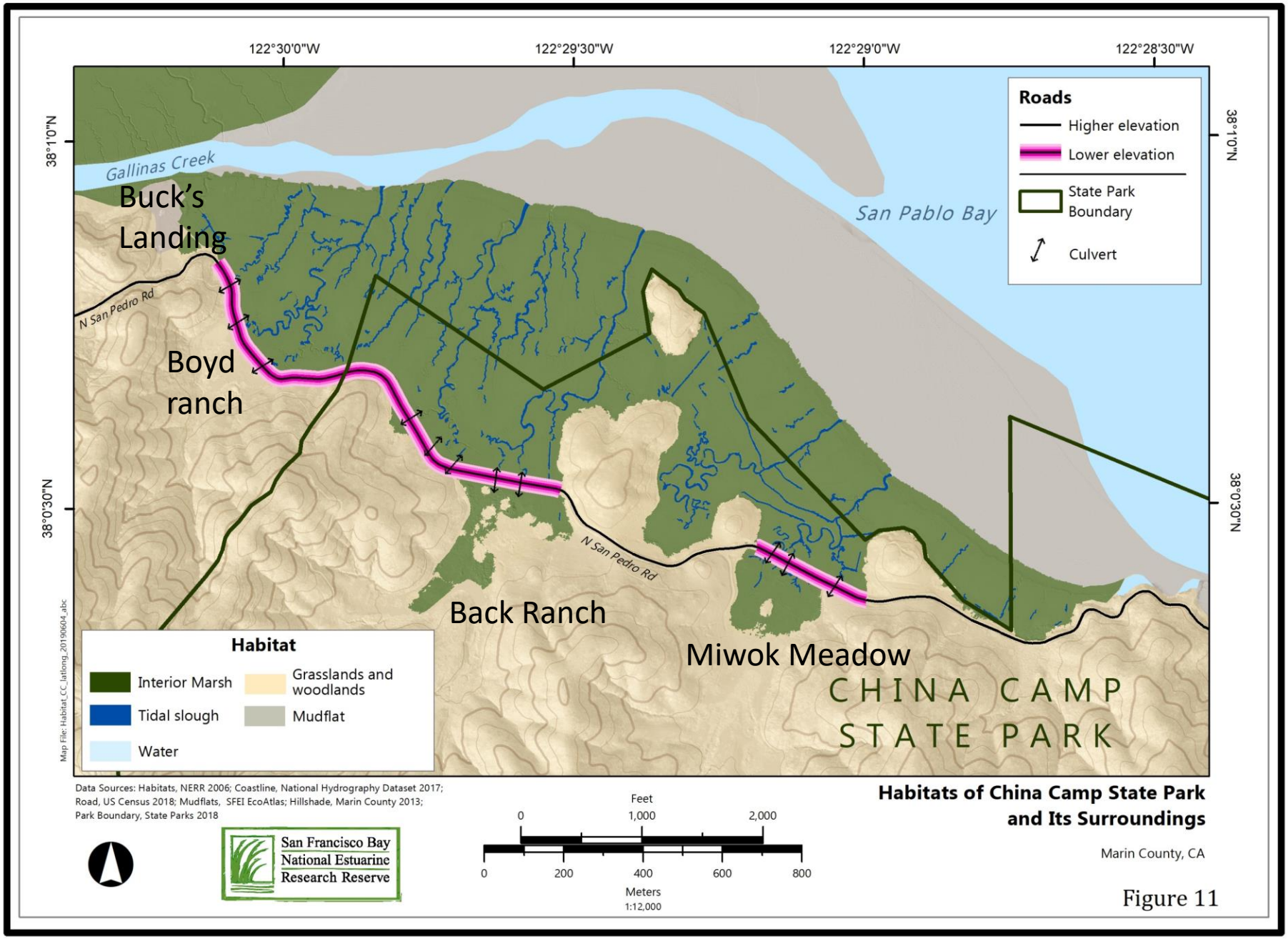
A Reminder: the Road Problem in a Nutshell
Stakeholder Group Meeting #3, June 12, 2019

Photo: Marilyn Bagshaw

Project Approach





Habitats of China Camp State Park and Its Surroundings

Marin County, CA

Figure 11

Next Steps Overview

Duration ~ 1 year

Feasibility Study

Output = Viable Alternatives

Duration ~ 2 year

Environmental Planning

Output = CEQA, Permits

Ready ~ 3-5 years out

Implementation

Output = On-the-Ground Solution

External Funding to Be Sought Sequentially for Each Step

Goals Performance Evaluation

Evaluation Approach

Evaluation Approach

This process mixes objective and subjective analysis. We hope it is fully capable of informing the decision-making at hand

Completed Before this Meeting

- Scoring system for each "cell" of the table
- Build scores going "down" – ie, for each goal and criterion, score all the alternatives with emphasis on comparative scoring between alternatives
- Scoring done initially by NERR project staff followed by multiple rounds of review and revision with State Parks and Marin County Public Works
- Marin County Public Works developed rough cost estimate ranges for construction of each alternative
- Integrated scoring
  - Runs risk of oversimplifying – comparing "apples to oranges" with added scoring can lose importance of factors driving the scores
  - Weighting – higher weight given to key issues identified by NERR, Parks and County as critical to outcomes and/or feasibility
  - Elected to sum separately for Goals and for Feasibility Criteria

During this Meeting

- Review and explain above
- Apply results of above to identifying alternatives with merit to carry into feasibility study

Weighting Choices

Weight	Goals	Feasibility Criteria
10x	Marsh protection and enhancement	
10x		Cost of construction
3x		Regulatory complexity
3x		Parks approval
10x		Marsh resources impacts
3x		Cultural resources impacts

Individual Item Scoring System

Score value	Goals	Feasibility Criteria	Color Code
2	fully achieves the goal	high feasibility	Dark green
1.5	partially to fully achieves the goal	medium to high feasibility	Light green
1	partially achieves the goal	medium feasibility	Yellow
0.5	nominally achieves the goal	low to medium feasibility	Orange
0	does not achieve the goal	low feasibility	Red
-1	NA	impediment to feasibility	Dark red

The Nine Alternatives

No.	Name
Raise-in-Place Alternatives	
1	Raise Road on Current Alignment via Solid Fill
2	Raise Road on Current Alignment via Pile-Supported Modular Causeway
3	Floating (Pontoon) Roadway
Reroute Alternatives	
4	The “Low Road” Relocation Around Back Ranch and/or Miwok Meadows
5	The “Middle Road” Reroute Higher up Within the Park and its Watershed
6	The “High Road” Reroute Over the Ridge
Maintain or Slightly Improve Existing Road Alternatives (“Maintain”)	
7	Retain Current Road and Improve Marsh Hydrology
8	Lower Road and Improve Marsh Hydrology
9	Maintain Status Quo – Allow Existing Road to Persist with Minimal Maintenance, No Replacement Road

Goals Performance Evaluation
Group 1: Raise-in-Place Alternatives

ALTERNATIVES		Recreation	Natural Resources	Road Corridor Function	Road Corridor Sea Level Rise	Score	
#	Description					%	Rank
	Weighting:	1	5 (marsh)	1	1		
1	**Raise road on current alignment, solid fill**		Marsh	Recreation	3 ft	**67%**	**6**** (tie)
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
2	**Raise road on current alignment, causeway**		Marsh	Recreation	3 ft	**100%**	**1**
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
3	**Floating roadway**		Marsh	Recreation	3 ft	**79%**	**5**
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			

Goals Performance Evaluation
Group 2: Reroute Alternatives

ALTERNATIVES		Recreation	Natural Resources	Road Corridor Function	Road Corridor Sea Level Rise	Score	
#	Description					%	Rank
	Weighting:	1	5 (marsh)	1	1		
4	Relocate around Miwok Meadows &/or Back Ranch		Marsh	Recreation	3 ft	89%	2
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
5	Higher route within Park watershed		Marsh	Recreation	3 ft	83%	4
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
6	High road over the ridge		Marsh	Recreation	3 ft	85%	3
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			

Goals Performance Evaluation
Group 3: "Maintain" Alternatives

ALTERNATIVES #	Description	Recreation	Natural Resources	Road Corridor Function	Road Corridor Sea Level Rise	Score %	Score Rank
	Weighting:	1	5 (marsh)	1	1		
7	**Retain grade and improve hydrology**		Marsh	Recreation	3 ft	**65%**	**7**
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
8	**Lower grade and improve hydrology**		Marsh	Recreation	3 ft	**67%**	**6**** (tie)
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			
9	**Maintain Status Quo**		Marsh	Recreation	3 ft	**19%**	**8**
				Commute			
				Evacuation			
				Emergency	7 ft		
			Uplands	Full corridor			

ROAD ADAPTATION GOALS

Scoring: 2 = Fully Achieves, 1 = Partially Achieves, 0 = Does not Achieve

Scoring
2
1.5
1
0.5
0
-1

		Recreation	Natural Resources (A) Marsh B) Uplands	Road Corridor Function A) Recreation B) Commuting C) Evacuation D) Emergency E) Full corridor	Road Corridor Sea Level Rise A) 3 ft B) 7 ft	SCORE	
	Weighting Factor -->	1	Marsh - 5 Uplands - 1	1 (average of all functions)	1 (average of A&B)	18	RANK
RAISE-IN-PLACE ALTERNATIVES							
1	Raise road on current alignment, solid fill					67%	6**
2	Raise road on current alignment, causeway					100%	1
3	Floating roadway					79%	5
REROUTE ALTERNATIVES							
4	Relocate around Miwok Meadows &/or Back Ranch					89%	2
5	Higher route within Park watershed					83%	4
6	High road over the ridge					85%	3
MAINTAIN OR SLIGHTLY IMPROVE EXISTING ROAD ALTERNATIVES							
7	Retain grade and improve hydrology					65%	7
8	Lower grade and improve hydrology					67%	6**
9	Maintain Status Quo					19%	8

Implementation Feasibility Performance Evaluation

Implementation Feasibility Criteria Performance Evaluation
Group 1: Raise-in-Place Alternatives

ALTERNATIVES		Cost	Regulatory Compliance		County Road Mission Consistency	State Parks Approval	Score
#	Description		Complexity	Cost			
	Weighting:	10	3	1	1	3	
1	Raise road on current alignment, solid fill	$5-10M					50%
2	Raise road on current alignment, causeway	$10-20M					61%
3	Floating roadway	$5-30M					15%

Implementation Feasibility Criteria Performance Evaluation
Group 2: Reroute Alternatives

ALTERNATIVES		Cost	Regulatory Compliance		County Road Mission Consistency	State Parks Approval	Score
#	Description		Complexity	Cost			
	Weighting:	10	3	1	1	3	
4	Relocate around Miwok Meadows &/or Back Ranch	$25-50M					-14%
5	Higher route within Park watershed	$25-50M					-32%
6	High road over the ridge	$50-100M					-35%

Implementation Feasibility Criteria Performance Evaluation
Group 3: "Maintain" Alternatives

ALTERNATIVES		Cost	Regulatory Compliance		County Road Mission Consistency	State Parks Approval	Score
#	Description		Complexity	Cost			
	Weighting:	10	3	1	1	3	
7	Retain grade and improve hydrology	~$5M					72%
8	Lower grade and improve hydrology	$5-10M					66%
9	Maintain Status Quo	~$1M					92%

Resource Protection Performance Evaluation

Resource Protection Criteria Performance Evaluation
Group 1: Raise-in-Place Alternatives

#	Alternatives Description	Natural Resources *Marsh*	Natural Resources *Upland*	Cultural Resources	Hillside Growth Avoidance	Trail Relocation Avoidance	Score
	Weighting:	10	1	3	1	1	
1	**Raise road on current alignment, solid fill**						**59%**
2	**Raise road on current alignment, causeway**						**75%**
3	**Floating roadway**						**75%**

Resource Protection Criteria Performance Evaluation
Group 2: Reroute Alternatives

#	Alternatives Description	Natural Resources *Marsh*	Natural Resources *Upland*	Cultural Resources	Hillside Growth Avoidance	Trail Relocation Avoidance	Score
	Weighting:	10	1	3	1	1	
4	Relocate around Miwok Meadows &/or Back Ranch						72%
5	Higher route within Park watershed						89%
6	High road over the ridge						83%

Resource Protection Criteria Performance Evaluation
Group 3: "Maintain" Alternatives

#	Alternatives Description	Natural Resources *Marsh*	Natural Resources *Upland*	Cultural Resources	Hillside Growth Avoidance	Trail Relocation Avoidance	Score
	Weighting:	10	1	3	1	1	
7	**Retain grade and improve hydrology**						**83%**
8	**Lower grade and improve hydrology**						**73%**
9	**Maintain Status Quo**						**67%**

Environmental Outcomes Performance Evaluation

Environmental Outcomes Criteria Performance Evaluation
Group 1: Raise-in-Place Alternatives

#	Alternatives Description	Carbon Footprint	Sea Level Rise Adaptability	Maximize Environ. Benefits	Score
	Weighting:	1	1	1	
1	Raise road on current alignment, solid fill				33%
2	Raise road on current alignment, causeway				83%
3	Floating roadway				67%

Environmental Outcomes Criteria Performance Evaluation
Group 2: Reroute Alternatives

#	Alternatives Description	Carbon Footprint	Sea Level Rise Adaptability	Maximize Environ. Benefits	Score
	Weighting:	1	1	1	
4	Relocate around Miwok Meadows &/or Back Ranch				67%
5	Higher route within Park watershed				67%
6	High road over the ridge				67%

Environmental Outcomes Criteria Performance Evaluation
Group 3: "Maintain" Alternatives

#	Alternatives Description	Carbon Footprint	Sea Level Rise Adaptability	Maximize Environ. Benefits	Score
	Weighting:	1	1	1	
7	Retain grade and improve hydrology				83%
8	Lower grade and improve hydrology				83%
9	Maintain Status Quo				83%

All Feasibility Criteria Performance Evaluation

FEASIBILITY CRITERIA

Scoring: 2 = Higher Feasibility, 1 = Moderate Feasibility, 0 = Low Feasibility, -1 = Impediment

Scoring		Implementation					Resource Protection					Environmental Outcomes			SCORE				
2		COST* 30 yr Construction O&M Mitigation	Regulatory Compliance Complexity	Regulatory Compliance Cost of CEQA & Permit Compliance	County Road Mission Consistency	Parks Approval	Natural Resource Protection Marsh	Natural Resource Protection Uplands	Cultural Resource Protection	Avoid Hillside Growth Inducement	Trail Relocation Avoidance	Carbon Footprint	Sea Level Rise Adaptability	Maximize Environ. Benefits	Implementation	Resource Protection	Environ. Outcomes	TOTAL	
1.5																			
1																			
0.5																			
0																			
-1																			
Weighting Factor -->		10	3	1	1	3	10	1	3	1	1	1	1	1	36	32	6	74	RANK
RAISE-IN-PLACE ALTERNATIVES																			
1	Raise road on current alignment, solid fill	$5-10 M													50%	59%	33%	53%	5
2	Raise road on current alignment, causeway	$10-20 M													61%	75%	83%	69%	3
3	Floating roadway	$5-30M													15%	75%	67%	45%	6
REROUTE ALTERNATIVES																			
4	Relocate around Miwok Meadows &/or Back Ranch	$25-50M													-14%	72%	67%	30%	7
5	Higher route within Park watershed	$25-50M													-32%	89%	67%	28%	8
6	High road over the ridge	$50-100M													-35%	83%	50%	23%	9
MAINTAIN OR SLIGHTLY IMPROVE EXISTING ROAD ALTERNATIVES																			
7	Retain grade and improve hydrology	~$5M													72%	83%	83%	78%	2
8	Lower grade and improve hydrology	$5-10M													57%	73%	83%	66%	4
9	Maintain Status Quo	~$1M													92%	67%	83%	80%	1

Combined Performance Evaluation

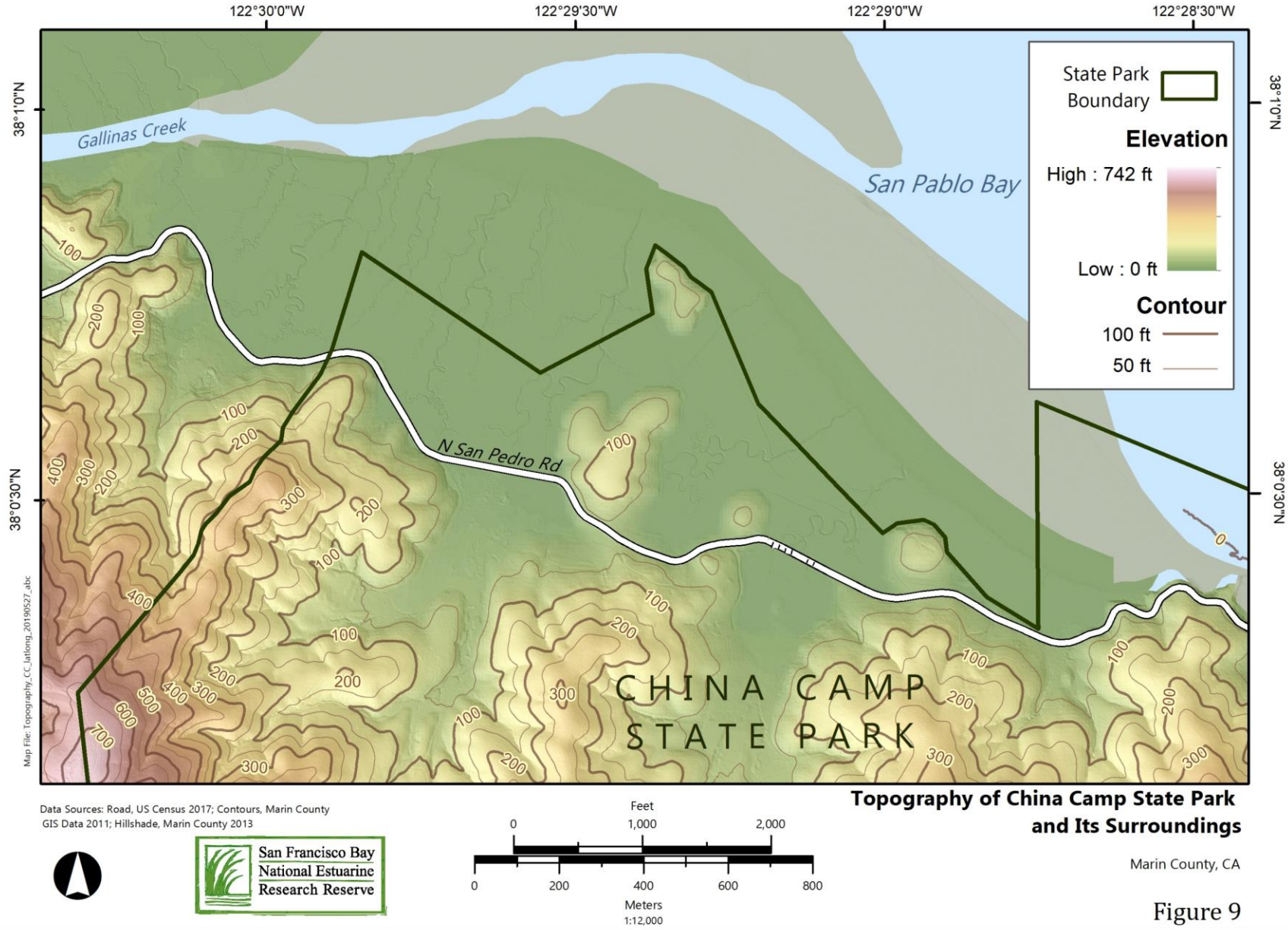
Scoring	ROAD ADAPTATION GOALS Scoring: 2 = Fully Achieves, 1 = Partially Achieves, 0 = Does not Achieve						FEASIBILITY CRITERIA Scoring: 2 = Higher Feasibility, 1 = Moderate Feasibility, 0 = Low Feasibility, -1 = Impediment														
2 1.5 1 0.5 0 -1							Implementation					Resource Protection					Environmental Outcomes			SCORE				
	Recreation	Natural Resources A) Marsh B) Uplands	Road Corridor Function A) Recreation B) Commuting C) Evacuation D) Emergency E) Full corridor	Road Corridor Sea Level Rise A) 3 ft B) 7 ft	SCORE		COST* 30 yr Construction O&M Mitigation	Regulatory Compliance Complexity	Regulatory Compliance Cost of CEQA & Permit Compliance	County Road Mission Consistency	Parks Approval	Natural Resource Protection Marsh	Natural Resource Protection Uplands	Cultural Resource Protection	Avoid Hillside Growth Inducement	Trail Relocation Avoidance	Carbon Footprint	Sea Level Rise Adaptability	Maximize Environ. Benefits	Implementation	Resource Protection	Environ. Outcomes	TOTAL	
Weighting Factor -->	1	Marsh - 5 Uplands - 1	1 (average of all functions)	1 (average of A&B)	18	RANK	10	3	1	1	3	10	1	3	1	1	1	1	1	36	32	6	74	RANK
RAISE-IN-PLACE ALTERNATIVES																								
1 Raise road on current alignment, solid fill					67%	6**	$5-10 M													50%	59%	33%	53%	5
2 Raise road on current alignment, causeway					100%	1	$10-20 M													61%	75%	83%	69%	3
3 Floating roadway					79%	5	$5-30M													15%	75%	67%	45%	6
REROUTE ALTERNATIVES																								
4 Relocate around Miwok Meadows &/or Back Ranch					89%	2	$25-50M													-14%	72%	67%	30%	7
5 Higher route within Park watershed					83%	4	$25-50M													-32%	89%	67%	28%	8
6 High road over the ridge					85%	3	$50-100M													-35%	83%	50%	23%	9
MAINTAIN OR SLIGHTLY IMPROVE EXISTING ROAD ALTERNATIVES																								
7 Retain grade and improve hydrology					65%	7	~$5M													72%	83%	83%	78%	2
8 Lower grade and improve hydrology					67%	6**	$5-10M													57%	73%	83%	66%	4
9 Maintain Status Quo					19%	8	~$1M													92%	67%	83%	80%	1

Small Group Discussion Topics

- What resonates or not
- Which alternatives would you advance and why?
- Which alternatives would you not advance and why?

The Nine Alternatives

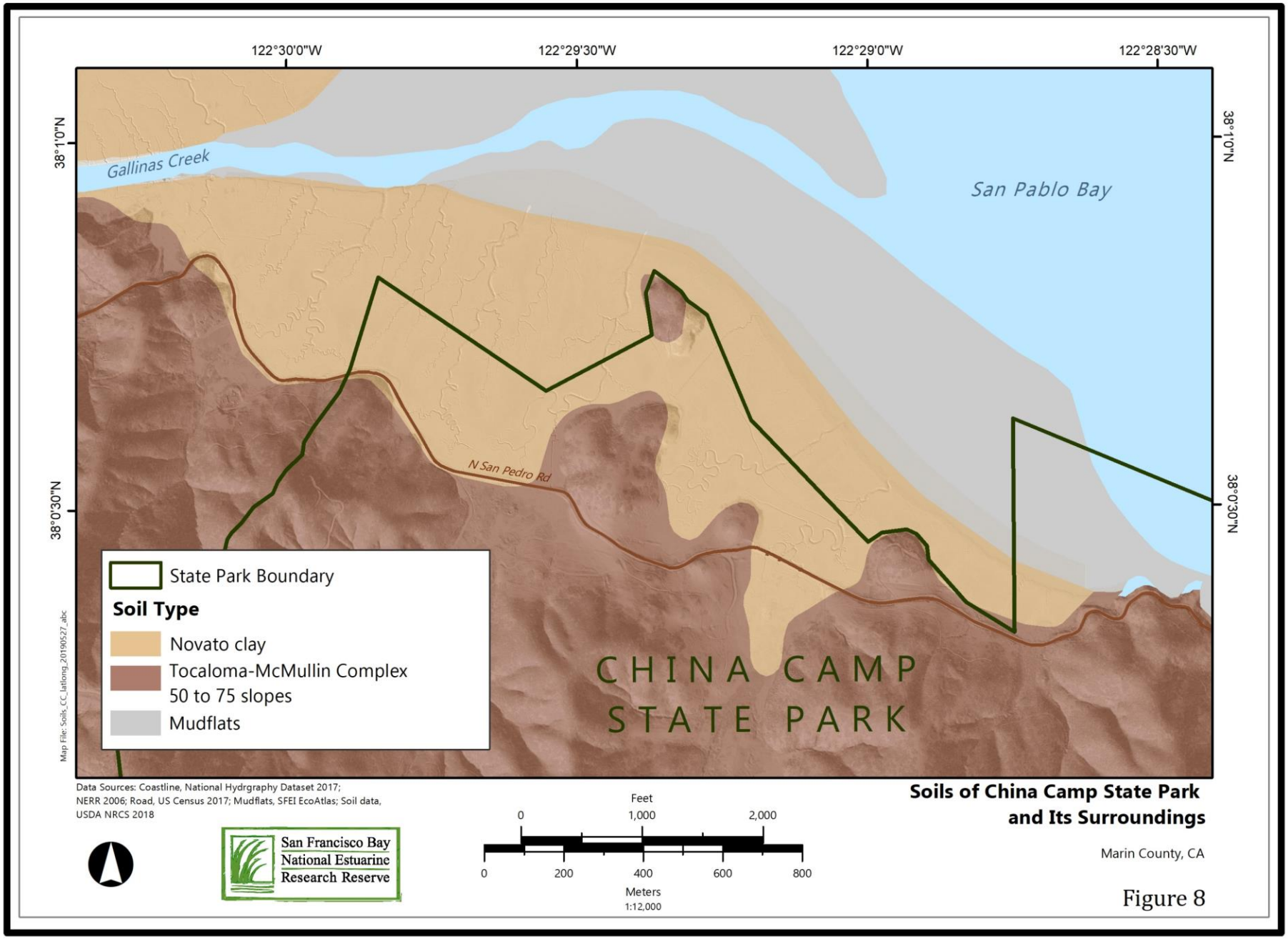
#	Name	Advance	Do Not Advance
Raise-in-Place Alternatives			
1	Raise Road on Current Alignment via Solid Fill		NNNNN
2	Raise Road on Current Alignment via Pile-Supported Modular Causeway	YYYYY	
3	Floating (Pontoon) Roadway	MM	NN
Reroute Alternatives			
4	The "Low Road" Relocation Around Back Ranch and/or Miwok Meadows	MMMY	N
5	The "Middle Road" Reroute Higher up Within the Park and its Watershed	MMY	NN
6	The "High Road" Reroute Over the Ridge	M	NNNN
Maintain or Slightly Improve Existing Road Alternatives ("Maintain")			
7	Retain Current Road and Improve Marsh Hydrology	YYYYM	
8	Lower Road and Improve Marsh Hydrology	M	NNNN
9	Maintain Status Quo – Allow Existing Road to Persist with Minimal Maintenance, No Replacement Road	CEQA no action required	



Topography of China Camp State Park and Its Surroundings

Marin County, CA

Figure 9



Soils of China Camp State Park and Its Surroundings

Marin County, CA

Figure 8

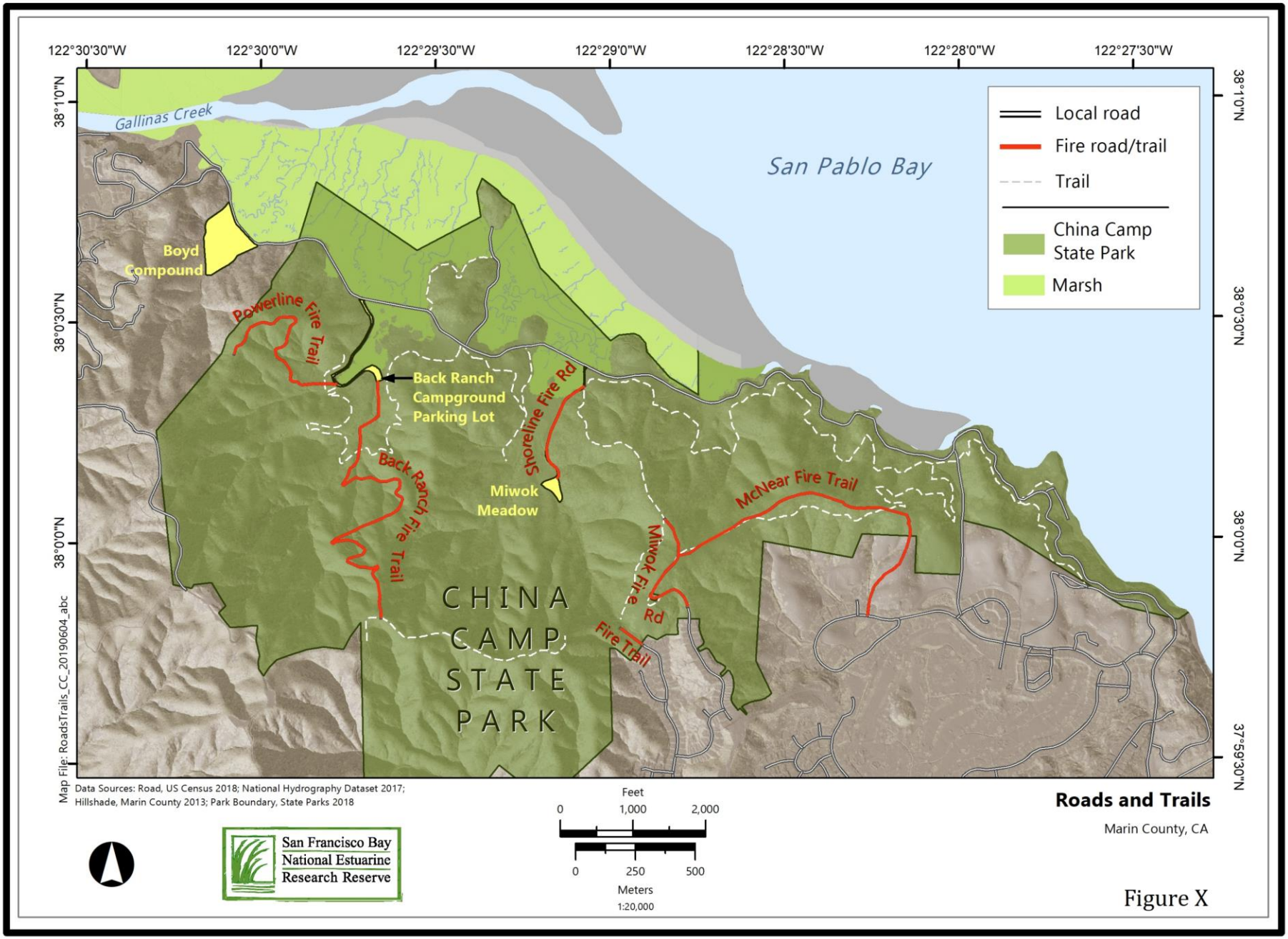
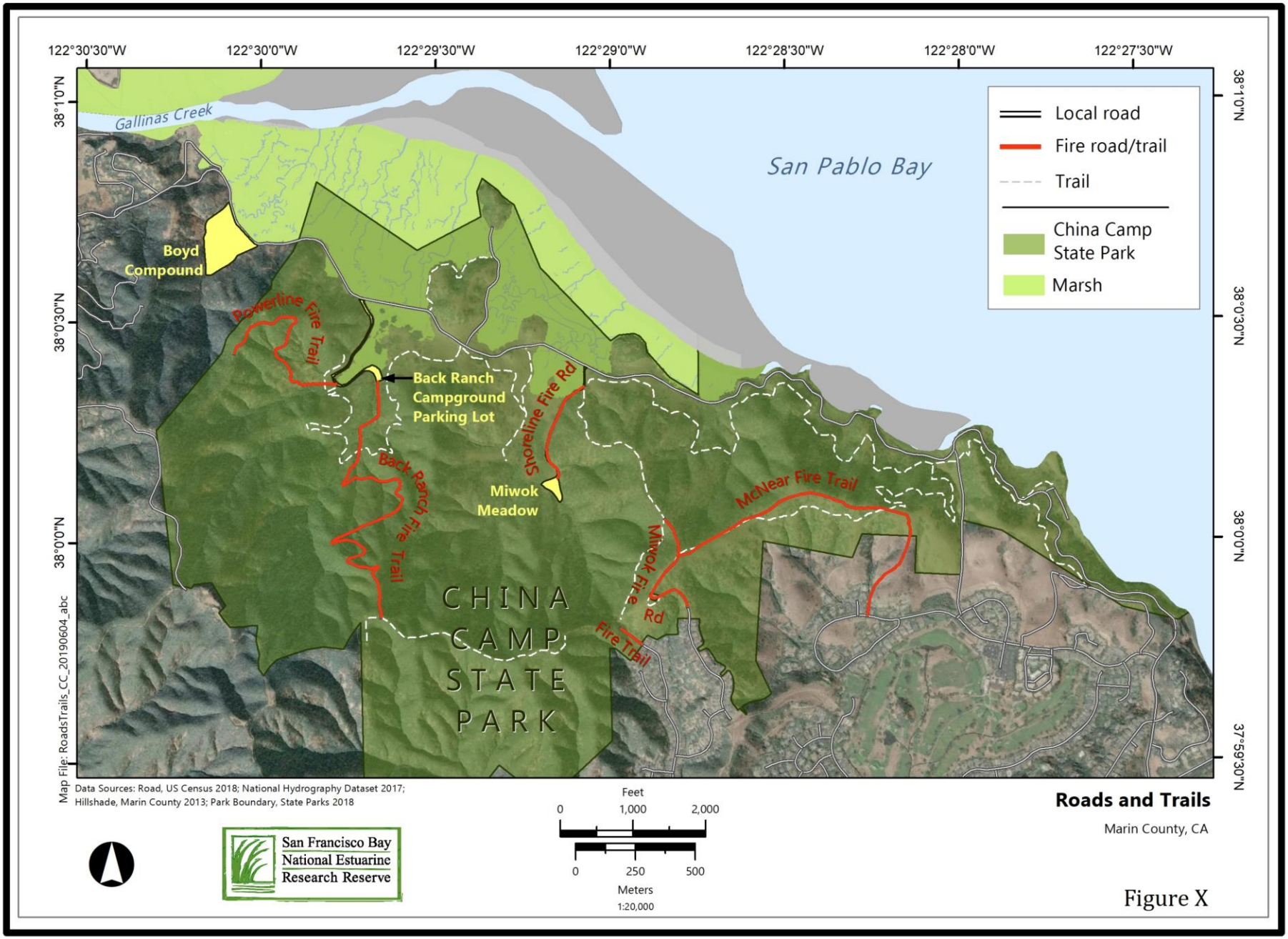

122°30'30"W
122°30'0"W
122°29'30"W
122°29'0"W
122°28'30"W
122°28'0"W
122°27'30"W
38°1'0"N
38°0'30"N
38°0'0"N
37°59'30"N
Gallinas Creek
San Pablo Bay
Local road
Fire road/trail
Trail
China Camp State Park
Marsh
Boyd Compound
Powerline Fire Trail
Back Ranch Campground Parking Lot
Shoreline Fire Rd
Back Ranch Fire Trail
Miwok Meadow
McNear Fire Trail
Miwok Fire Rd
Fire Trail
CHINA CAMP STATE PARK
Map File: RoadsTrails_CC_20190604_abc
Data Sources: Road, US Census 2018; National Hydrography Dataset 2017; Hillshade, Marin County 2013; Park Boundary, State Parks 2018
Feet
0
1,000
2,000
0
250
500
Meters
1:20,000
San Francisco Bay National Estuarine Research Reserve
Roads and Trails
Marin County, CA

Figure X


122°30'30"W
122°30'0"W
122°29'30"W
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122°28'30"W
122°28'0"W
122°27'30"W
38°1'0"N
38°0'30"N
38°0'0"N
37°59'30"N
Gallinas Creek
San Pablo Bay
Local road
Fire road/trail
Trail
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Marsh
Boyd Compound
Powerline Fire Trail
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Shoreline Fire Rd
Back Ranch Fire Trail
Miwok Meadow
McNear Fire Trail
Miwok Fire Rd
Fire Trail
CHINA CAMP STATE PARK
Map File: RoadsTrails_CC_20190604_abc
Data Sources: Road, US Census 2018; National Hydrography Dataset 2017; Hillshade, Marin County 2013; Park Boundary, State Parks 2018
Feet
0
1,000
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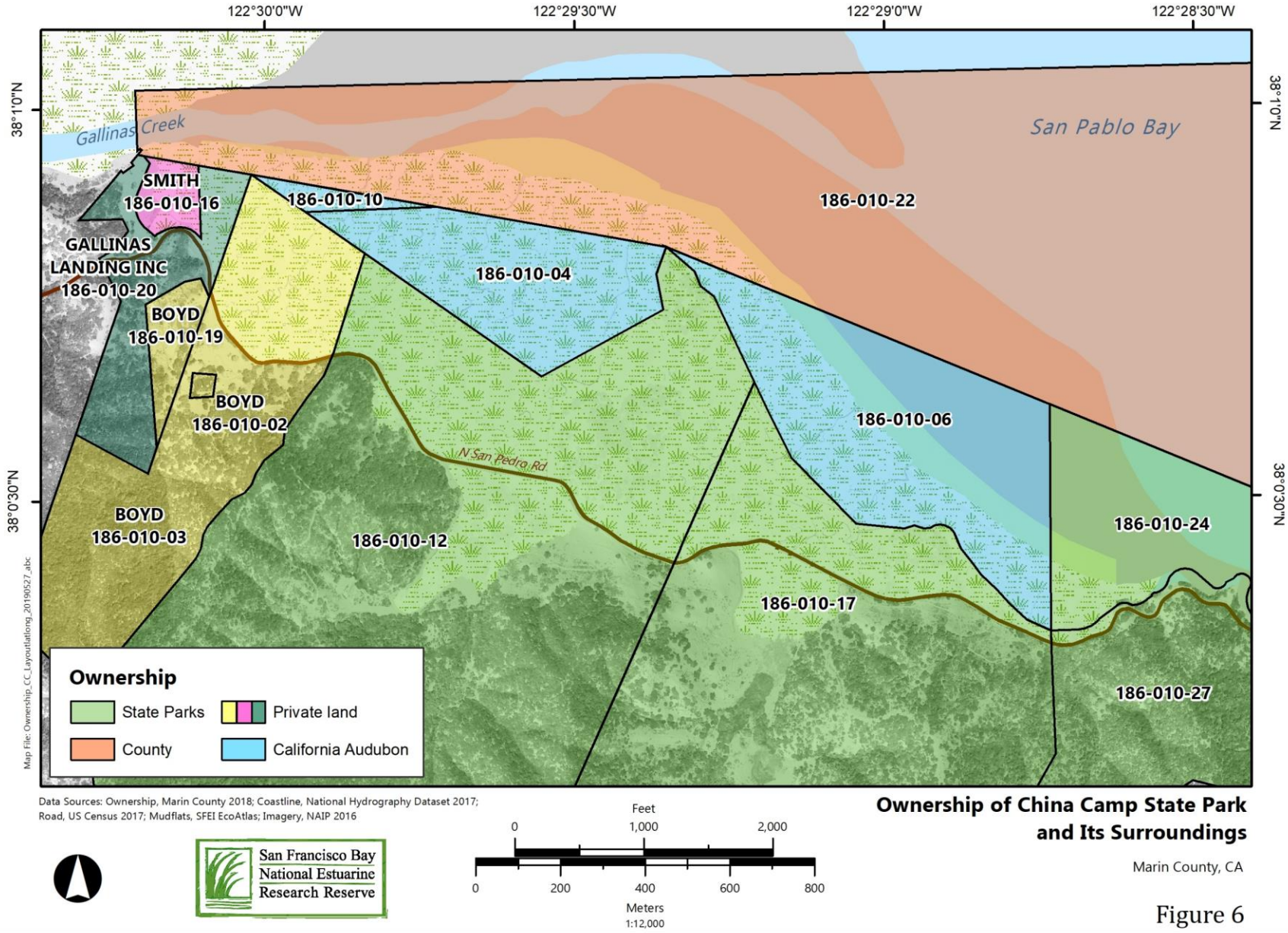
250
500
Meters
1:20,000
San Francisco Bay National Estuarine Research Reserve
Roads and Trails
Marin County, CA

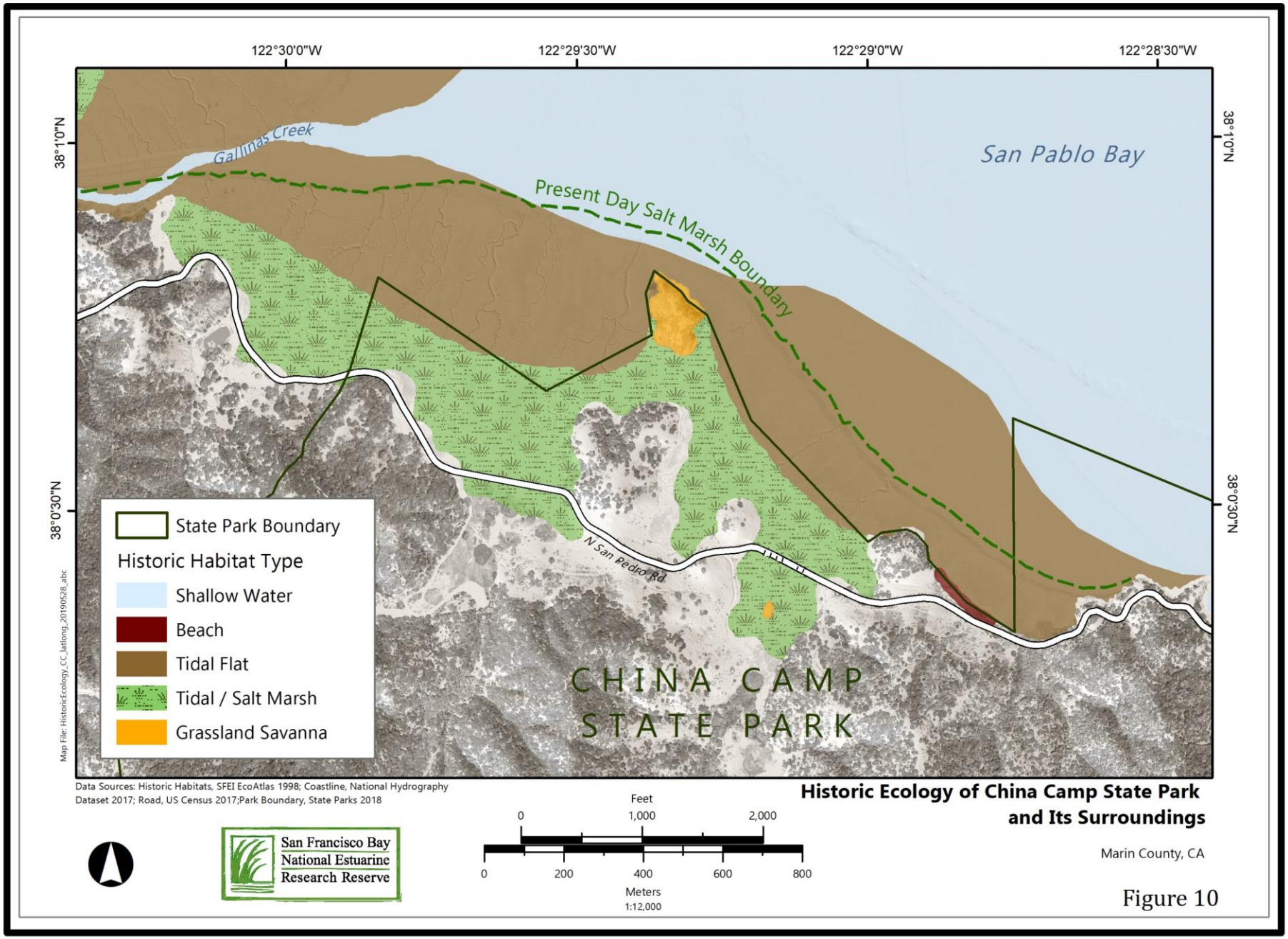
Figure X



Ownership of China Camp State Park and Its Surroundings

Marin County, CA

Figure 6



Historic Ecology of China Camp State Park and Its Surroundings

Marin County, CA

Figure 10

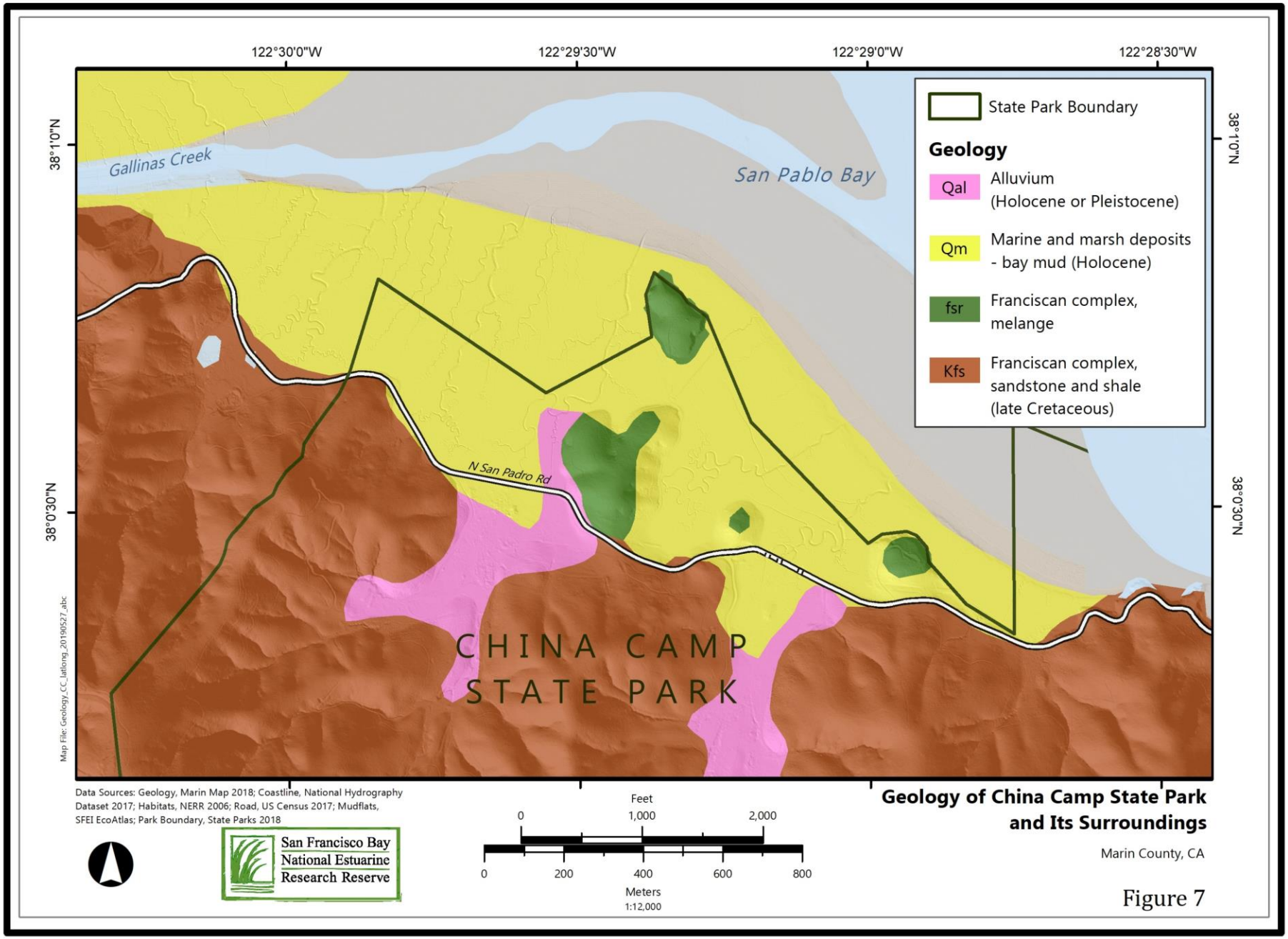
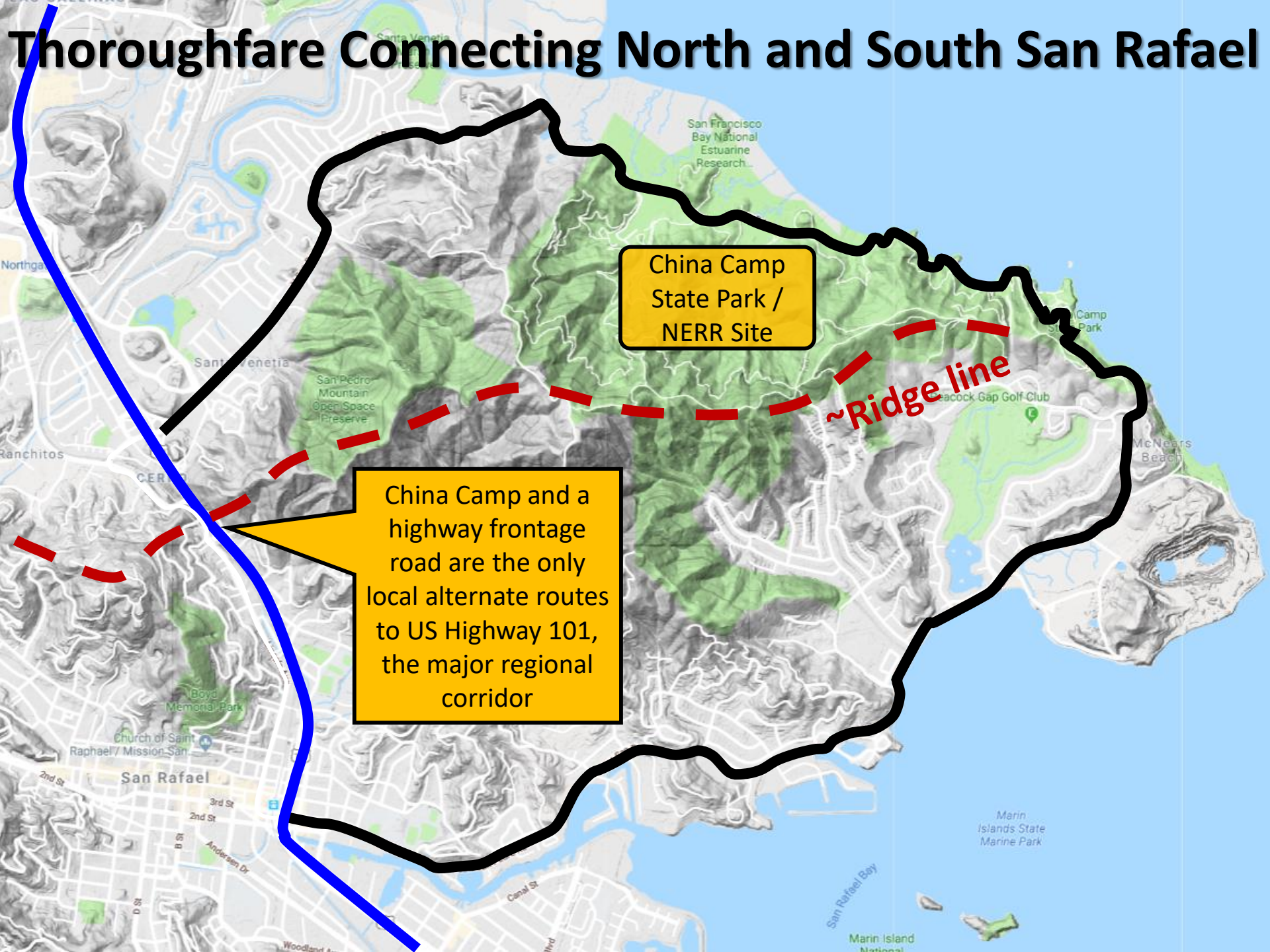
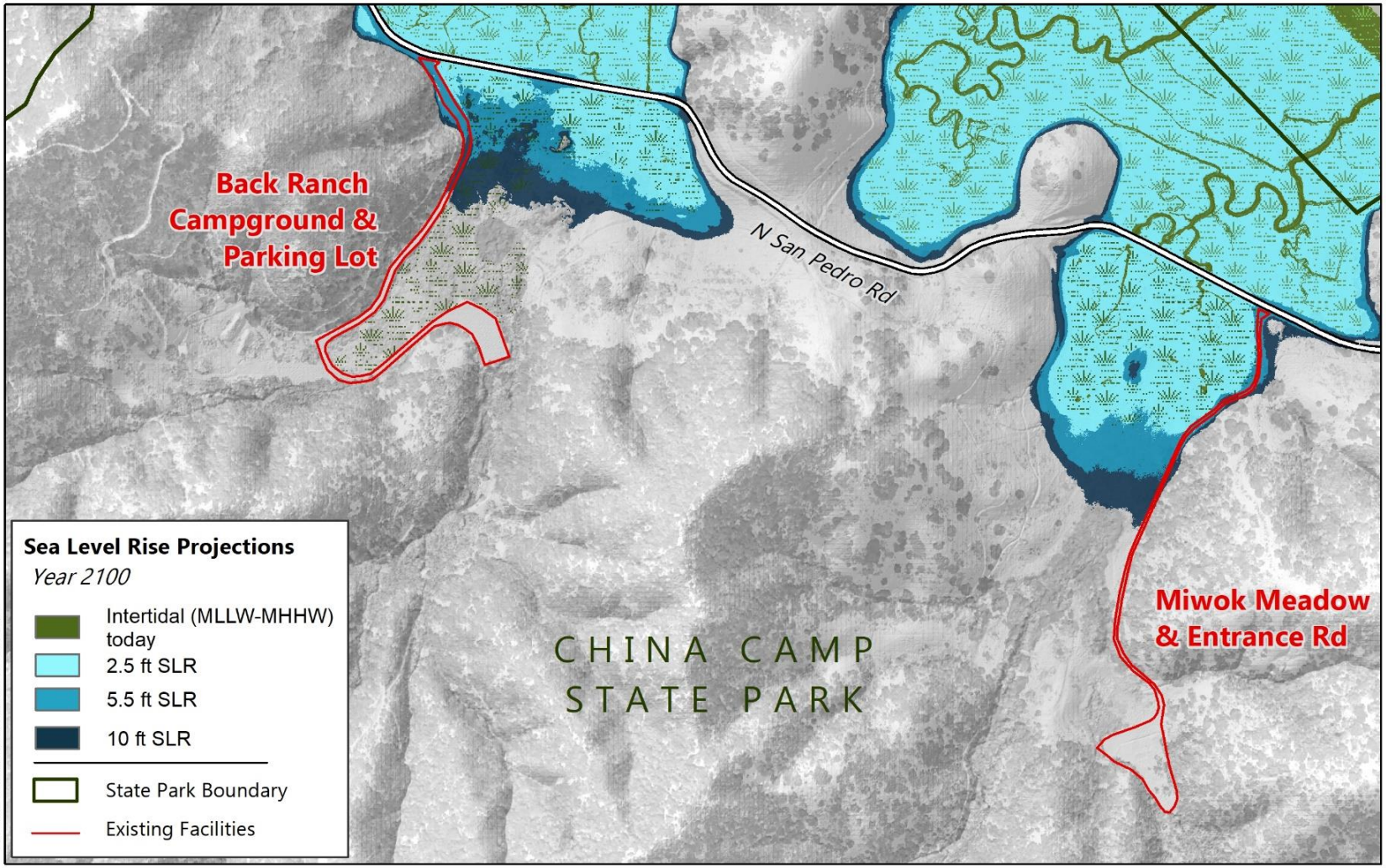

122°30'0"W
122°29'30"W
122°29'0"W
122°28'30"W
38°1'0"N
38°0'30"N
Gallinas Creek
San Pablo Bay
N San Padro Rd
CHINA CAMP
STATE PARK
State Park Boundary
Geology
Qal
Alluvium
(Holocene or Pleistocene)
Qm
Marine and marsh deposits
- bay mud (Holocene)
fsr
Franciscan complex,
melange
Kfs
Franciscan complex,
sandstone and shale
(late Cretaceous)
Map File: Geology_CC_latlong_20190527.abc
Data Sources: Geology, Marin Map 2018; Coastline, National Hydrography Dataset 2017; Habitats, NERR 2006; Road, US Census 2017; Mudflats, SFEI EcoAtlas; Park Boundary, State Parks 2018
San Francisco Bay
National Estuarine
Research Reserve
Feet
0
1,000
2,000
0
200
400
600
800
Meters
1:12,000
Geology of China Camp State Park
and Its Surroundings
Marin County, CA

Figure 7

Thoroughfare Connecting North and South San Rafael





Data Sources: DEM, Marin County 2013; Coastline, National Hydrography Dataset 2017; ; Road, US Census 2017; Mudflats, SFEI EcoAtlas; Park Boundary, State Parks 2018;

North

San Francisco Bay National Estuarine Research Reserve

Feet
0 1,000
0 200 400
Meters
1:6,5000

Projected Sea Level Rise in China Camp State Park and Its Surroundings

Marin County, CA

Figure 5A