



**Cost Summary by Alternative**

1. Estimated Annual Program Operating Costs
2. Estimated Transit Services and Cost Analysis and Estimate  
Revenue Generation Analysis
3. MH/FB Transportation Management Plan DRAFT Plan for Car  
Free Zones on Pre-selected Days in the Marin Headlands and  
Fort Baker

**Estimated Annual Program Operating Costs**

<b>Item/Project Title</b>	<b>Alternative 1 No Action</b>	<b>Alternative 2 Basic Access</b>	<b>Alternative 3 Enhanced Access</b>	<b>Alternative 4 Maximum Access</b>
<b>Transit</b>				
Golden Gate Transit	\$0	\$0	\$527,000	\$527,000
S.F. MUNI	\$0	\$85,000	\$410,000	\$410,000
Internal park shuttle	\$0	\$0	\$420,000 - \$575,000	\$870,000 - \$1,130,000
<i>Transit Subtotal</i>	<i>\$0</i>	<i>\$85,000</i>	<i>\$1,357,000 - \$1,512,000</i>	<i>\$1,807,000 - \$2,067,000</i>
<b>Car Free Days</b>				
Test & Monitor Car-Free Days at Fort Baker/Marin Headlands (1-season test of 7 days)	\$0	\$0	\$128,600 - \$151,300	\$128,600 - \$151,300
<i>Car Free Days Subtotal</i>	<i>\$0</i>	<i>\$0</i>	<i>\$128,600 - \$151,300</i>	<i>\$128,600 - \$151,300</i>
<b>Parking Fee Program</b>				
Fee collection	\$0	\$0	\$300,000	\$300,000
Maintenance	\$0	\$0	\$40,000	\$40,000
Public Information	\$0	\$0	\$10,000	\$10,000
<i>Parking Cost of Collection Subtotal</i>	<i>\$0</i>	<i>\$0</i>	<i>\$350,000</i>	<i>\$350,000</i>
<b>Annual Operating Cost Total</b>	<b>\$0</b>	<b>\$85,000</b>	<b>\$1,835,600 - \$2,013,300</b>	<b>\$2,285,600 - \$2,568,300</b>

Source: Golden Gate National Recreation Area. *Marin Headlands/Fort Baker Transportation Infrastructure and Management Plan, Estimated Transit Services and Cost Analysis and Estimate Revenue Generation Analysis March 17, 2005 (revised)*, and *GGNRA Marin Headlands Transportation Management Plan (MH/FB TMP) DRAFT Plan for Car Free Zones on Pre-Selected Days in the Marin Headlands and Fort Baker (revised January 25, 2005)*.

Note: Transit operating costs in Chapter 2 have been adjusted to reflect inflation rate to 2007 dollars.

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## **Marin Headlands – Fort Baker Roadway Improvements and Transportation Management Plan**

### **Transit Service and Cost Estimates Explanation**

**The service estimates were assessed using a standard schedule matrix that included route distance, run time, approximate speed, frequency of service and cycle time. The result produced a finding showing the number of buses needed to provide service and the number of hours required to provide service. From these numbers the estimated cost could be assessed.**

The cost estimates utilize an incremental hourly cost range of \$85-\$115 per service hour. The low end is based on an estimate of contract service using a private carrier. The high end cost is based on the (fall 2004) cost information received from MUNI and Golden Gate Transit.

Golden Gate Transit (GGT) service on Route 10 accesses GGNRA lands in Fort Baker on Alexander Avenue 7 days a week on a 60 minute frequency (spring 2005). Bus service to this area was reduced by 50%, and the number of routes on this alignment was reduced from three to one in late 2003. A Route 10 realignment to serve Fort Baker will require additional equipment, and additional cost to GGT. The estimate in this analysis is that a revision of Route 10 so that all trips serve Fort Baker seven days a week will cost over \$500,000 annually.

Therefore, all analysis and assumptions for the MH-FB Roadway Improvements and TMP have been completed using future Route 10 service levels and this level of added costs. Golden Gate Transit cost estimates for revised service are the same for Alts. 2, 3, and 4, because the proposed service changes are the same for all three alternatives.

S. F. MUNI (MUNI) service costs are assumed at \$115 per service hour. The proposed cost estimates for MUNI are the cost per hour multiplied by the number of hours of proposed additional service.

Shuttle costs are assumed from a low end of \$85 per service hour to a high end of \$115 per service hour. Like with MUNI and GGT service cost estimates, the proposed cost estimates for the shuttle is the cost per hour multiplied by the number of hours of proposed service. The proposed service has been designed to possibly meet Fort Baker Retreat and Conference Center (RCC) needs for local shuttle service, as well as provide the internal shuttle service that is needed in Fort Baker and the Marin Headlands. No operator has been proposed for this service. At the high end cost it is theoretically possible that MUNI or GGT could contract to operate the service.

## **Marin Headlands – Fort Baker Roadway Improvements and Transportation Management Plan**

### **Transit Service Alternatives and Recurring Operations Cost Estimates (REVISED 3-17-05)**

#### **Existing Service / Alternative #1: No Action Cost \$ 0**

Golden Gate Transit: Golden Gate Transit (GGT) provides access to the Marin Headlands – Fort Baker areas of GGNRA via Route 10 seven days a week. Approximately 14-17 bus trips per day – 7 days a week access GGNRA in each direction. Buses on Route 10 operate between Mill Valley and downtown San Francisco (via Sausalito, the Golden Gate Bridge Toll Plaza, and Geary Blvd.) These buses connect with major GGT and SF MUNI routes at the northern and southern route terminals. Bus stops are located on Alexander Avenue, but direct service is not provided to the main post area of Fort Baker or to the Marin Headlands areas of the park. Several other GGT routes operate through this portion of the park on US 101, including GGT Routes 70 and 80 that stop at Spencer Avenue. Approximately 40 bus trips per day (M-F) and 30 trips per day (weekends) serve the Spencer Avenue stops in both directions where a trailhead connects to the park.

S. F. MUNI: MUNI provides access to the Marin Headlands – Fort Baker areas of GGNRA via bus Route 76 on Sundays and holidays only. A total of 9 bus trips access GGNRA in each direction. Service is provided to the Marin Headlands area of the park via Conzelman Road, McCullough Road, Bunker Road, Field Road, Bunker Road, and Mitchell Road all the way to Rodeo Beach at Fort Cronkhite.

Other (Shuttles): Regularly scheduled service on The Sausalito Local Land Area Yacht (SALLY) was discontinued in 2004. The service did operate on weekends and holidays during the peak season between the main post area of Fort Baker and downtown Sausalito.

#### **Alternative #2: Basic Access Cost \$85,000**

Golden Gate Transit: Golden Gate Transit (GGT) provides access to the Marin Headlands – Fort Baker areas of GGNRA via Route 10 seven days a week. Approximately 14-17 bus trips per day – 7 days a week access GGNRA in each direction. Buses on Route 10 operate between Mill Valley and the Golden Gate Bridge Toll Plaza via Sausalito every 60 minutes. These buses connect with major GGT and SF MUNI routes at the northern and southern route terminals. Bus stops are located on Alexander Avenue, but direct service is not provided to the main post area of Fort Baker or to the Marin Headlands areas of the park. Several other GGT routes operate through this portion of the park on US 101, including GGT Routes 70 and 80 that stop at Spencer Avenue. Approximately 40 bus trips per day (M-F) and 30 trips per day (weekends) serve the Spencer Avenue stops in both directions where a trailhead connects to the park.

This analysis advocates that GGT service on Route 10 continue to serve stops along Alexander Avenue, and that service on Routes 70 and 80 continue to stop and serve the Spencer Avenue interchange to provide access to a GGNRA trailhead located on the west side of the interchange.

S. F. MUNI: MUNI continues to provide access to the Marin Headlands – Fort Baker areas of GGNRA via bus Route 76 on Sundays and holidays, but Saturday service at the same frequency as Sunday service is added. The combined new and existing service would result in 9 bus trips accessing GGNRA in each direction. A frequency of 60 minutes would be in place during both weekend days. The Saturday service would duplicate the existing Sunday service with both providing direct service to the Marin Headlands area of the park via Conzelman Road, McCullough Road, Bunker Road, Field Road, Bunker Road, and Mitchell Road all the way to Rodeo Beach.

Other (Shuttles): No new shuttle system is proposed.

The Fort Baker Retreat and Conference Center is required to operate a shuttle or assist in the operation of a shuttle as part of the approved Ft. Baker Redevelopment Plan. At this date it has not yet been determined how they will meet this requirement.

The Sausalito Local Land Area Yacht (SALLY) ended regular service in 2004.

### **Alternative #3: Enhanced Access**

**Cost: \$1,357,000-1,512,000**

Golden Gate Transit: Golden Gate Transit (GGT) provides access to the Marin Headlands – Fort Baker areas of GGNRA via Route 10 seven days a week. Approximately 14-17 bus trips per day – 7 days a week access GGNRA in each direction. Buses on Route 10 operate between Mill Valley and the Golden Gate Bridge Toll Plaza via Sausalito every 60 minutes. These buses connect with major GGT and SF MUNI routes at the northern and southern route terminals. Bus stops are located on Alexander Avenue, but direct service is not provided to the main post area of Fort Baker or to the Marin Headlands areas of the park. Several other GGT routes operate through this portion of the park on US 101, including GGT Routes 70 and 80 that stop at Spencer Avenue. Approximately 40 bus trips per day (M-F) and 30 trips per day (weekends) serve the Spencer Avenue stops in both directions where a trailhead connects to the park.

This analysis advocates GGT service on Route 10 is re-routed via East Road and Bunker Road to serve the main post area of Fort Baker and redesigned / improved stops are implemented along Alexander Avenue near the US 101 underpass.

This analysis advocates that GGT service on Routes 70 and 80 continue to stop and serve the Spencer Avenue interchange to provide access to a GGNRA trailhead located on the west side of the interchange.

S. F. MUNI: MUNI continues to provide access to the Marin Headlands – Fort Baker areas of GGNRA via bus Route 76 on Sundays and holidays, but Saturday service is added. Both the new Saturday service and the existing Sunday service are increased to provide a 30 minute frequency. The combined new and existing service would result in 18 bus trips accessing GGNRA in each direction. The Saturday service would duplicate the existing Sunday service with both providing direct service to the Marin Headlands area of the park via Conzelman Road, McCullough Road, Bunker Road, Field Road, Bunker Road, and Mitchell Road all the way to Rodeo Beach.

Other (Shuttles): A new shuttle system is implemented. This document doesn't propose to define the actual operator.

The new service will provide internal mobility within the park. It is not designed to provide additional access from outside areas to this area of the park. A total of 13 bus trips per weekday, and 13 bus trips per weekend day are provided that operate between Fort

Baker and the Marin Headlands via Bunker Road, Alexander Avenue, Conzelman Road, McCullough Road, Field Road, Bunker Road, and Mitchell Road to Rodeo Beach. The trips are operated on frequency of 60 minutes throughout the day, seven days a week.

The Sausalito Local Land Area Yacht (SALLY) ended regular service in 2004.

**Alternative #4: Maximum Access**  
**Cost: \$1,807,000--\$2,067,000**

**Golden Gate Transit:** Golden Gate Transit service in Alternative #4 would be the same as the service provided in Alternative #3.

**S. F. MUNI:** S.F. MUNI (MUNI) service in Alternative #4 would be the same as the service provided in Alternative #3.

**Other (Shuttles):** A new shuttle system is implemented. This document doesn't propose to define the actual operator.

Unlike the shuttle alternative in Alt. #3, the new service will provide additional access to this area of the park by serving off-site parking areas and visitor attractions in Sausalito, at the Manzanita transit center, and at the Golden Gate Bridge Toll Plaza. A total of 6 bus trips per weekday and weekend day will serve Sausalito and the Manzanita transit center, and a total of 7 bus trips per weekday and weekend day will serve the Golden Gate Bridge Toll Plaza. The shuttle trips that operate to serve off-site locations are operated on a 120 minute (2 hr.) frequency throughout the day seven days a week.

The shuttle service will also improve internal mobility. A total of 13 bus trips per weekday, and 13 bus trips per weekend day are provided that operate between Fort Baker and the Marin Headlands via Bunker Road, Alexander Avenue, Conzelman Road, McCullough Road, Field Road, Bunker Road, and Mitchell Road to Rodeo Beach. The trips are operated on frequency of 60 minutes throughout the day seven days a week. The off-site shuttle service and the internal shuttle service are interlined to maximize the coverage of the service while minimizing costs.

The Fort Baker Retreat and Conference Center is required to operate a shuttle or assist in the operation of a shuttle as part of the approved Ft. Baker Redevelopment Plan. At this date it has not yet been determined how they will meet this requirement.

At the time this alternative was drafted it proposed a new shuttle that essentially duplicated the route of the Sausalito Local Land Area Yacht (SALLY). SALLY ended regular service in 2004, so the proposed duplication is no longer an issue.

**Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan**  
Transit Service Alternatives (Advanced Definition) and Service Matrix  
GGT Service - Rt. 10 changes only / MUNI Service - Rt. 76 changes only / Shuttle Service (See Map)  
Notes: Access = GGT and/or MUNI service with stops along Alexander Ave /  
MH = service with stops in the Marin Headlands / FB = service with stops in Fort Baker

Service Operations Matrix									
Existing Service									
		Monday - Friday		Saturday		Sunday			
	Access	MH	FB	Access	MH	FB	Access	MH	FB
GGT	16			16			16		
MUNI							9	9	
(Shuttle(s))									
Daily Trips	16	0	0	16	0	0	25	9	0
Time (Frequency)	60	0	0	60	0	0	30-60	60	0

Alternative #2 (Basic Access)									
		Monday - Friday		Saturday		Sunday			
	Access	MH	FB	Access	MH	FB	Access	MH	FB
GGT	16			16			16		
MUNI				9	9		9	9	
(Shuttle(s))		6	6						
Daily Trips	16	6	22	25	9	0	25	9	0
Time (Frequency)	60	60	20-60	60	20-60	20-60	20-40	20-60	20-60

Alternative #3 (Enhanced Access)									
		Monday - Friday		Saturday		Sunday			
	Access	MH	FB	Access	MH	FB	Access	MH	FB
GGT	16		16	15	15	15	15	15	15
MUNI				18	18	18	18	18	
(Shuttle(s))		13	13		13	13		13	13
Daily Trips	16	13	29	33	31	28	33	31	28
Time (Frequency)	60	60	20-40	20-40	20-40	20-40	20-40	20-40	20-40

Alternative #4 (Maximum Access)									
		Monday - Friday		Saturday		Sunday			
	Access	MH	FB	Access	MH	FB	Access	MH	FB
GGT	16		16	15	15	15	15	15	15
MUNI				18	18	18	18	18	
Other (Shuttle(s))		13	13	13	13	13	13	13	13
Daily Trips	29	13	29	44	31	28	46	31	28
Time (Frequency)	20-40	60	20-40	15-30	20-40	20-40	10-30	20-40	20-40

**Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan**  
Transit Service Alternatives (Advanced Definition) and Service Matrix  
GGT Service - Rt. 10 changes only / MUNI Service - Rt. 76 changes only / Shuttle Service (See Map)

UPDATED March 17, 2005

Cost of Service Matrix									
Existing Service									
Cost Estimate Analysis is not applicable to this area									

Alternative 2 (Basic Access)					
		MON-FRI	SAT	SUN	Total
Estimated Costs for New or Revised Service					
GGT M-F		\$0	\$0	\$0	\$0
MUNI		\$0	\$85,000	\$0	\$85,000
(Shuttles)		\$0	\$0	\$0	\$0
Total		\$0	\$85,000	\$0	\$85,000

Alternative 3 (Enhanced Access)					
		MON-FRI	SAT	SUN	Total
Estimated Costs for New or Revised Service					
GGT M-F		\$350,000	\$85,000	\$92,000	\$527,000
MUNI		\$0	\$275,000	\$135,000	\$410,000
(Shuttles)		290,000-395,000	65,000-90,000	65,000-90,000	420,000-575,000
Total		640,000-745,000	425,000-450,000	292,000-317,000	1,357,000-1,512,000

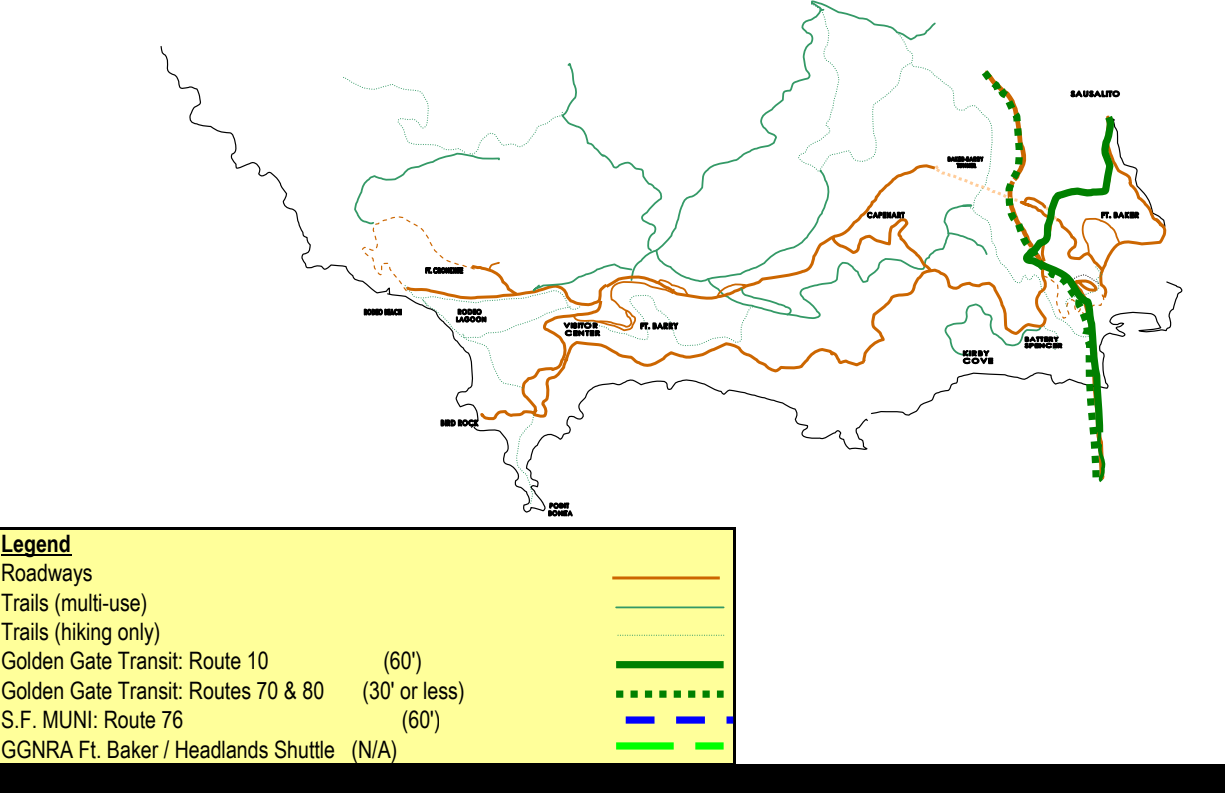
Alternative 4 (Maximum Access)					
		MON-FRI	SAT	SUN	Total
Estimated Costs for New or Revised Service					
GGT M-F		\$350,000	\$85,000	\$92,000	\$527,000
MUNI		\$0	\$275,000	\$135,000	\$410,000
Other (Shuttles)		600,000-780,000	135,000-175,000	135,000-175,000	870,000-1,130,000
Total		950,000-1,130,000	495,000-535,000	362,000-402,000	1,807,000-2,067,000



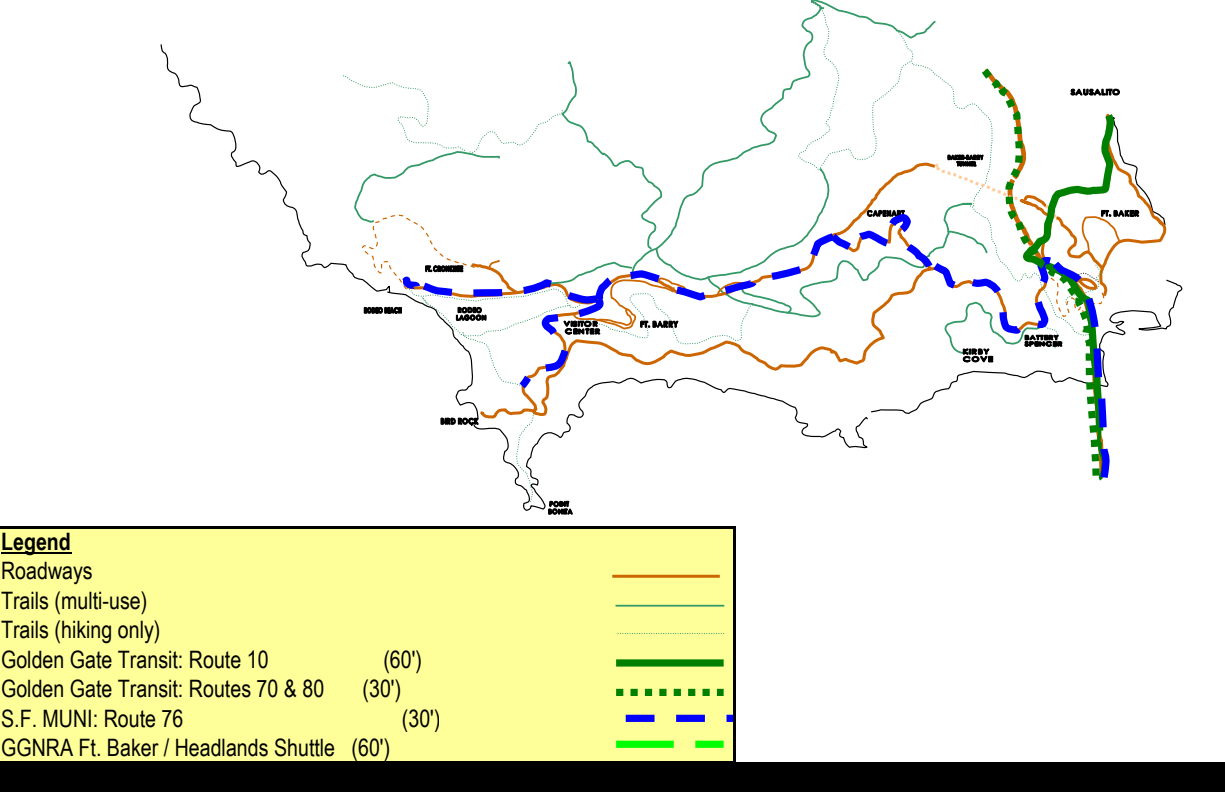
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Transit / Shuttle Service --- Existing Conditions (Alt. 1 - No Action): Monday - Friday & Saturday

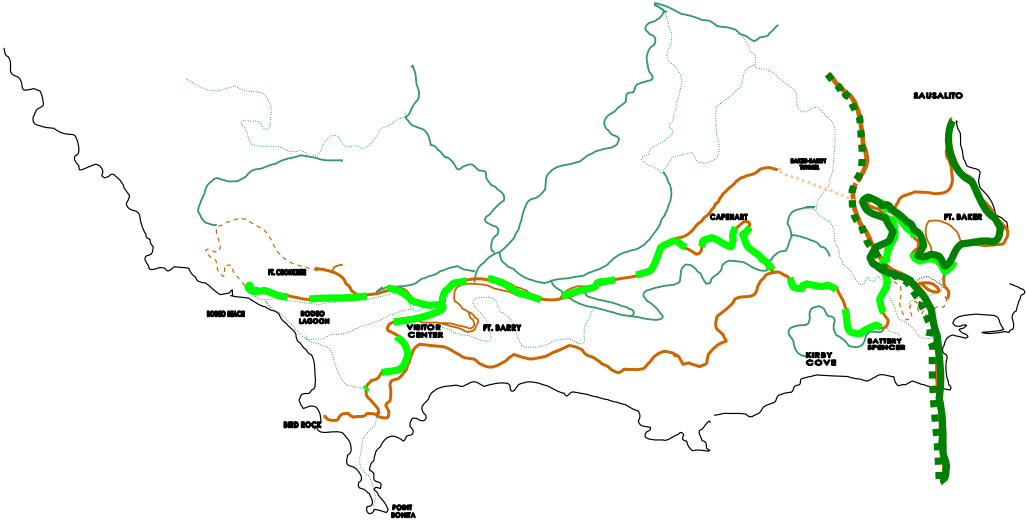


Transit / Shuttle Service --- Existing Conditions (Alt 1 - No Action): Sunday ONLY



Transit / Shuttle Service Alternative #2  
same as Existing Conditions - No Action Alternative, except re-route of GGT Route 10  
(to see proposed re-route of Route 10 - see map below)

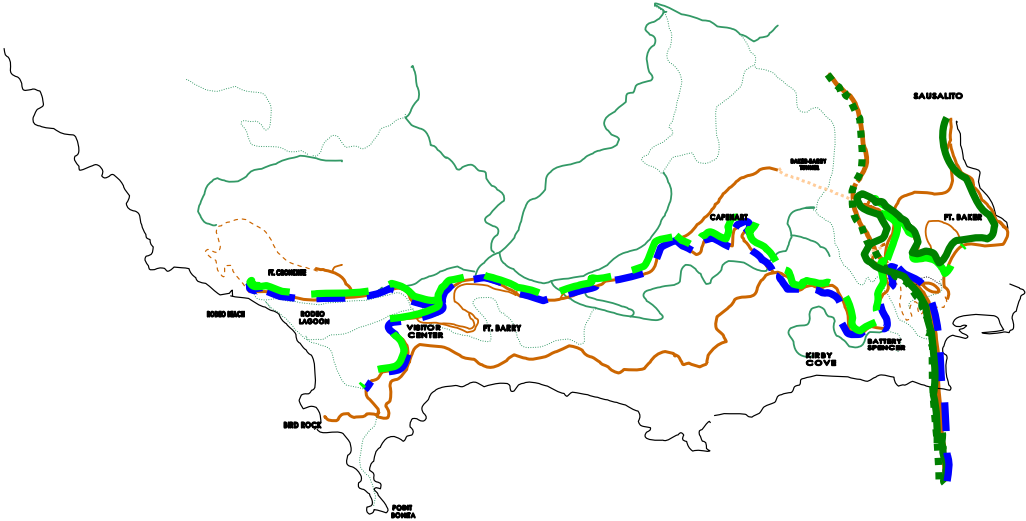
Transit / Shuttle Service Alternative #3: Monday-Friday



**Legend**

Roadways	—
Trails (multi-use)	—
Trails (hiking only)	—
Golden Gate Transit: Route 10 (60')	—
Golden Gate Transit: Routes 70 & 80 (30' or less)	- - -
S.F. MUNI: Route 76 (N/A)	- - -
GGNRA Ft. Baker / Headlands Shuttle (60')	- - -

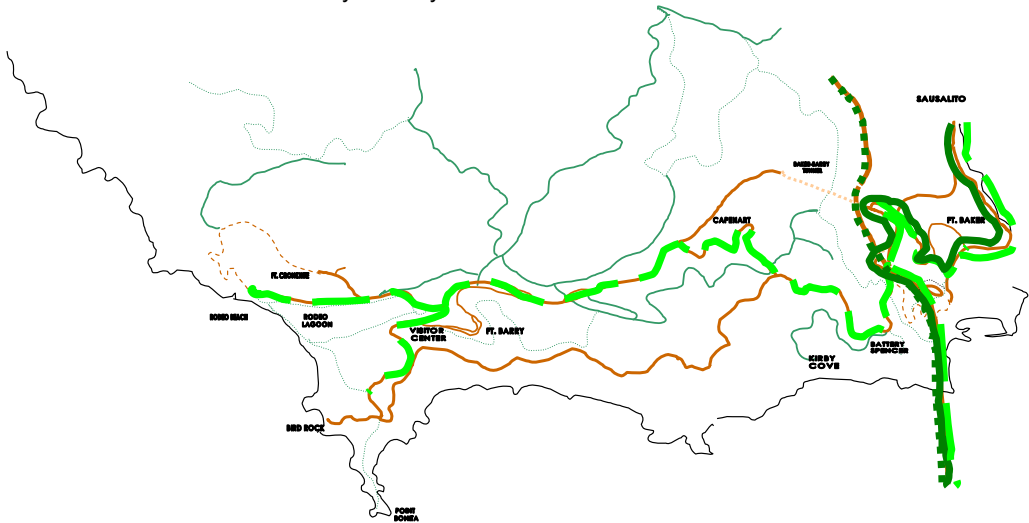
Transit / Shuttle Service Alternative #3: Saturday - Sunday



**Legend**

Roadways	—
Trails (multi-use)	—
Trails (hiking only)	—
Golden Gate Transit: Route 10 (60')	—
Golden Gate Transit: Routes 70 & 80 (30')	- - -
S.F. MUNI: Route 76 (30')	- - -
GGNRA Ft. Baker / Headlands Shuttle (60')	- - -

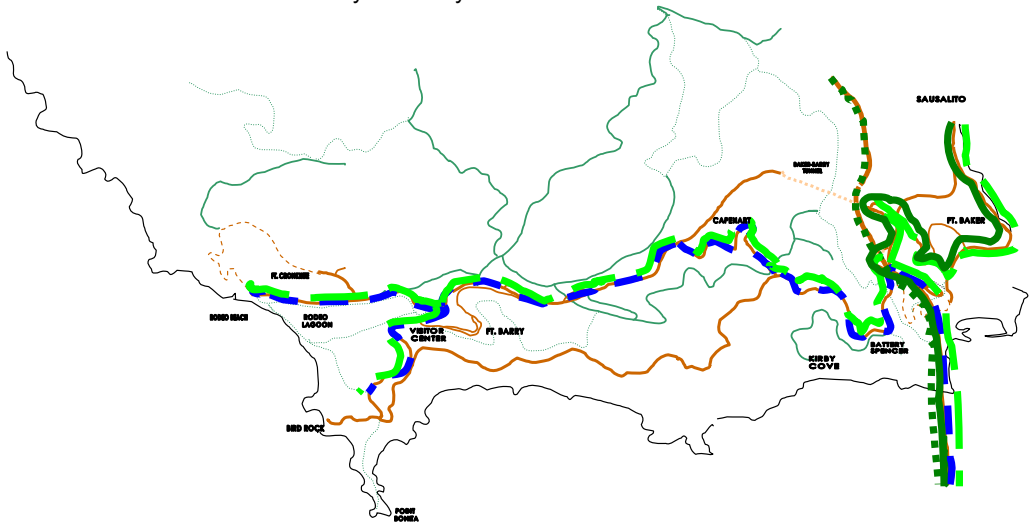
Transit / Shuttle Service Alternative #4: Monday - Friday



**Legend**

Roadways	Orange line
Trails (multi-use)	Green line
Trails (hiking only)	Yellow line
Golden Gate Transit: Route 10	(60') Solid green line
Golden Gate Transit: Routes 70 & 80	(30' or less) Dashed green line
S.F. MUNI: Route 76	(N/A) Dashed blue line
GGNRA Ft. Baker / Headlands Shuttle	(60') Solid green line

Transit / Shuttle Service Alternative #4: Saturday - Sunday



**Legend**

Roadways	Orange line
Trails (multi-use)	Green line
Trails (hiking only)	Yellow line
Golden Gate Transit: Route 10	(60') Solid green line
Golden Gate Transit: Routes 70 & 80	(30') Dashed green line
S.F. MUNI: Route 76	(30') Dashed blue line
GGNRA Ft. Baker / Headlands Shuttle	(60') Solid green line

## Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan

### Revenue - Paid Parking - Capehart Housing - Shuttle Fares

**Intro:** The estimates shown below are hypothetical projections based on Nelson Nygaard data collected during the MH-FB study, and park visitation figures (traffic counters).

<b>Concept A</b>	<b>Description</b>	Entrance fee (not possible due to existing legislation)
	<b>Gross Revenue</b>	<b>\$2,000,000+ annually</b>
	<b>Expenses</b>	<b>N/A (estimated at \$150,000 annually)</b>
	<b>Net Revenue</b>	<b>\$1,850,000+ annually</b>
	<b>Explanation</b>	The estimated revenue is based upon existing visitation levels recorded between 1997-2000 at all MH/FB park entrances, and that each vehicle pays \$1 to enter the park. This is only included to show how much revenue the park could collect.

<b>Concept B</b>	<b>Description</b>	Paid parking at sites of major visitor interest - 7 days a week
	<b>Gross Revenue</b>	<b>\$610,580</b>
	<b>Expenses</b>	<b>\$350,000</b>
	<b>Net Revenue</b>	<b>\$260,580</b>
	<b>Explanation</b>	The estimated revenue is based upon very conservative calculations of parking use levels by visitors that would pay for parking. The baseline assumptions included in the estimate were taken from information in the Nelson Nygaard study (F. 1-3, F. 1-12 in the Data Collection Analysis Report. These figures summarized vehicle trips. The raw data in F. 1-3 and Fig. 1-12 was added to with an off-peak season assumption, and then the analysis was done. A \$1 daily parking pass, a \$40 annual pass, and a \$2 weekly pass for Park Partners assumption were used. For the Battery Spencer and Wagner areas, an assumption that parking meters would be used due to the high turnover and high utilization of parking in this area has been removed from consideration. Eight units of Capehart Housing were also included as leasing revenue generators. Baseline information regarding this source was provided by Pat Madden. His memo is attached as an appendix. An attempt was made to account for basic expenses (maintenance fee collection and enforcement duties). An estimate of shuttle fare revenue is included.

<b>Concept C</b>	<b>Description</b>	Paid parking at sites of major visitor interest - 7 days a week
	<b>Gross Revenue</b>	<b>\$2,110,940</b>
	<b>Expenses</b>	<b>\$350,000</b>
	<b>Net Revenue</b>	<b>\$1,760,940</b>
	<b>Explanation</b>	The estimated revenue is based upon the same conservative calculations of parking use assumed for Concept B, but the parking pass fee was increased from \$1 to \$5, and the long term parking pass fee was increased \$2 per week to \$5 per week. All other baseline information is the same for the two concepts.

#### To summarize what this means.

\* It appears possible that after a preliminary review, the NPS could be able to generate **\$250,000** in annual revenue if a **\$1 daily** parking fee is charged 7 days a week during the entire year in the MH/FB areas of the park, a **\$2 weekly** employee/park partner fee is implemented, a **\$40 park specific annual fee pass** is implemented, and lease revenue from 8 Capehart housing units rented at market rate is allocated.

\* It appears possible that after a preliminary review, the NPS would be able to generate **\$1.75 million** in annual revenue if a **\$5 daily** parking fee is charged 7 days a week during the entire year in the MH/FB areas of the park, a **\$5 weekly** employee/park partner fee is also implemented, and a **\$40 park specific annual fee pass** is implemented, and lease revenue from 8 Capehart housing units rented at market rate is allocated.

## Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan

### Conclu- sion

See the following pages for detailed spreadsheets and the initial assumptions used in this analysis.

The program described here, and shown in detail in an EXCEL table following this text, is only one of multiple ways to generate fee revenue. There are many possible fee collection concepts that could be implemented. For example the park could be free in the off-peak season, and charge \$2 in the peak season, or charge a higher fee on weekends, etc., etc. Revenue numbers would change somewhat, but without making big changes, the \$260,000 - \$1,750,000 range for revenue generation appears defensible given the other assumptions included.

The issue of paying for alternative transportation programs (transit and other multi-modal improvements (e.g. car-free days), is an issue where more information is needed by the park. Concepts B and C were done to show a starting point estimate of the revenue potential.

I completed my analysis using two days of data collected during the peak season, and two days of shoulder season data collected by Nelson Nygaard Consultants (NN). A greater level of baseline visitation data would be highly useful to better confirm these assumptions.

paul bignardi - transportation planner

NPS-GGNRA

(revised 1-5-05)

(no revision needed 3-17-05)

## Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan

### Concept B: Basic Parking Fees (PROJECTED LOW END)

#### Category 1: General Parking (parking pass)

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill, Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day		vehicles	paid vehicles (28.8% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	peak	weekend	<i>See Appendix A: A series of calculations were developed to obtain a "daily avg." number of vehicles regardless of season, or day of the week.</i>		1029	\$1	8	4	\$32,928
2	peak	weekday			1029	\$1	22	4	\$90,552
3	shoulder	weekend			1029	\$1	8	4	\$32,928
4	shoulder	weekday			1029	\$1	22	4	\$90,552
5	off-peak	weekend			1029	\$1	8	4	\$32,928
6	off-peak	weekday			1029	\$1	22	4	\$90,552
	<b>Sub-Total</b>								<b>\$370,440</b>

#### Category #2: Metered Parking (parking meters) (REMOVED FROM CONSIDERATION)

Battery Spencer, Battery Wagner

	1	2	3	4	5	6	7	8	9
	season	type of day	use level at site (assumes 50 metered spaces)	hours of operation	paid vehicles (50% return)	amount paid (25c per 15") \$	days of month	number of months	sub-total revenue \$
7	peak	weekend	90%	0	22.5	\$1	8	4	-
8	peak	weekday	90%	0	22.5	\$1	22	4	-
9	shoulder	weekend	80%	0	20	\$1	8	3	-
10	shoulder	weekday	80%	0	20	\$1	22	3	-
11	off-peak	weekend	50%	0	12.5	\$1	8	5	-
12	off-peak	weekday	50%	0	12.5	\$1	22	5	-
	<b>Sub-Total</b>								-

#### Category #3: Long Term Parking Passes (to distinguish between "partner" and visitor vehicles)

Park Partners TDM program

	1	2	3	4	5	6	7	8	9
	season	vehicles				amount per pass (\$2 per week)		number of months	sub-total revenue \$
1	peak	150				\$8		4	\$4,800
2	shoulder	150				\$8		3	\$3,600
3	off-peak	100				\$8		5	\$4,000
	<b>Sub-Total</b>								<b>\$12,400</b>

#### Category #4: Capehart Housing Rental Revenue

	1	2	3	4	5	6	7	8	9
	units	rent (month) \$	months - year						sub-total revenue \$
1	8	\$2,000	12						\$192,000
3	<b>Sub-Total</b>								<b>\$192,000</b>



**Category #5: Shuttle Fares**

	1	2	3	4	5	6	7	8	9
	passengers (avg. per trip)	daily trips	avg. fare \$	days - year					sub-total revenue \$
1									
2	10	6	\$1	365					\$21,900
3	<b>Sub-Total</b>								<b>\$21,900</b>

**Category 6: General Parking (long-term (annual pass)**

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill,  
Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day	payment \$	vehicles	paid vehicles (9.7% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	annual	N/A	\$1		346	\$40	N./A	N/A	\$13,840
	<b>Sub-Total</b>								<b>\$13,840</b>

**Revenue**

Category #1(daily pass)									\$370,440
Category #2 (Battery Spencer meters)									\$0
Category #3 (Long term employee/partner pass)									\$12,400
Category #4 (Capehart housing rental)									\$192,000
Category #5 (Shuttle Fares) (lowest number of trips)									\$21,900
Category #6 (Annual Visitor Pass)									\$13,840
<b>Final Total</b>									<b>\$610,580</b>

Notes: Peak = Jun. Jul. Aug. Sep. Shoulder = Mar., Apr. May, Oct. Off-peak = Nov. Dec. Jan. Feb.

Category #5 estimates 10 passengers per trip average. If doubled to 20 passengers per trip, or the number of trips doubles (Alt. 3), revenue doubles to \$40,000 annually.

**Expenditures**

Fee Collection staff person (1 full-time = 3FTE's) to empty meters, manage paperwork (GS-9)									\$300,000
Maintenance of equipment / maintenance of housing									\$40,000
Printed Materials and Public Information									\$10,000
<b>Final Total</b>									<b>\$350,000</b>

**Net Total****\$260,580**

## Category #1 and Category #6 Revenue Assumptions

<b>Step #1:</b>	7049	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (peak))
	2329	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (peak))
	9378	Total
	5666	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (shoulder))
	1628	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (shoulder))
	7294	Total
<b>Step #2</b>	3750	Use a realistic assumption for off-peak avg. daily vehicle trips (Marin Headlands)
	1000	Use a realistic assumption for off-peak avg. daily vehicle trips (Fort Baker)
	4750	Total
<b>Step #3</b>	9378 * 4	Multiply avg. daily data by 4 for each park season (peak)
	7294 * 4	Multiply avg. daily data by 4 for each park season (shoulder)
	4750 * 4	Multiply avg. daily data by 4 for each park season (off-peak)
<b>Step #4</b>	85688	Add the three seasonal total together to come up with an annual total
<b>Step #5</b>	85688	Divide the annual total by 12 (no. of months)
	12	
<b>Step #6</b>	7141	Divide the total again by 2 (parking = 1/2 number of trips since a car can only park one
	2	time, but it takes an inbound and an outbound trip to complete a park visit)
<b>Step #7</b>	3570	At the completion of Step #5, the average daily vehicle number of trips (reduced by 50%)
		number is reached. This number is the potential number of vehicles (prior to other
		subtractions) AFTER AVERAGING that would park in these park areas 365 days a year
		Marin Headlands = 2,744 Fort Baker = 826
<b>Step #8</b>	2744	Marin Headlands daily vehicles (F1-3 in NN Report:Data Collection Analysis)
	826	Fort Baker daily vehicles (F1-12 in NN Report: Data Collection Analysis)
	3570	Total
<b>Step #9</b>	3570	Total Marin Headlands - Fort Baker Vehicles Starting Point
	-905	Subtract Battery Spencer (no parking charges at this site)
	2665	Revised Total
<b>Step #10</b>	2665	Split Revised Total into First Time Visitors (40%) and Repeat Visitors (60%)
	1065	First Time Visitors
	1540	Repeat Visitors
<b>Step #11</b>	1065	First Time Visitors
	-53	Subtract Visitors that don't park / park only at visitor center in free parking (5%)
	1012	Revised Total First Time Visitors
<b>Step #12</b>	1540	Repeat Visitors
	-154	Subtract 10% of total (assumed volume of staff / volunteers (other parking program))
	-346	Subtract 25% of revised total after Step #5 (visitors who visited 6+ times [NN survey])
<b>Step #13</b>		because they will likely use an annual pass or multi-use pass (fare media TBD) - See
	1040	Category 6 Total Concept B.
		Revised Total Repeat Visitors
<b>Step #14</b>	2052	Add First Time Visitors and Repeat Visitors revised totals together
<b>Step #15</b>	-677	Subtract an evasion rate of 33%
	1375	Total
<b>Step #16</b>	1375/3570 = 38%	This final number represents the estimated total number of daily vehicles that will pay a parking fee. It means that an estimated 38% of all vehicles entering this part of the park will pay a parking fee. When applied to Concept B the remaining total vehicles were separated into visitors that were assumed to pay a daily fee (75%) and visitors that would pay by using a long-term pass (25%). Therefore, an estimated 346 visitors (9.7% of entering vehicles) were assumed to pay using a long-term pass and 1,029 vehicles (28.8% of entering vehicles) were assumed to pay using a daily parking fee.

## Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan

### Concept C: Basic Parking Fees

(PROJECTED HIGH END)

#### Category 1: General Parking (parking pass)

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill, Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day		vehicles	paid vehicles (28.8% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	peak	weekend	<i>See Appendix A: A series of calculations were developed to obtain a "daily avg." number of vehicles regardless of season, or day of the week.</i>		1029	\$5	8	4	\$164,640
2	peak	weekday			1029	\$5	22	4	\$452,760
3	shoulder	weekend			1029	\$5	8	3	\$123,480
4	shoulder	weekday			1029	\$5	22	3	\$339,570
5	off-peak	weekend			1029	\$5	8	5	\$205,800
6	off-peak	weekday			1029	\$5	22	5	\$565,950
	<b>Sub-Total</b>								<b>\$1,852,200</b>

#### Category #2: Metered Parking (parking meters) (REMOVED FROM CONSIDERATION)

Battery Spencer, Battery Wagner

	1	2	3	4	5	6	7	8	9
	season	type of day	use level at site (assumes 50 metered spaces)	hours of operation	paid vehicles (50% return)	amount paid (50c per 15") \$	days of month	number of months	sub-total revenue \$
7	peak	weekend	90%	0	22.5	\$2	8	4	-
8	peak	weekday	90%	0	22.5	\$2	22	4	-
9	shoulder	weekend	80%	0	20	\$2	8	3	-
10	shoulder	weekday	80%	0	20	\$2	22	3	-
11	off-peak	weekend	50%	0	12.5	\$2	8	5	-
12	off-peak	weekday	50%	0	12.5	\$2	22	5	-
									-

#### Category #3: Long Term Parking Passes (to distinguish between "partner" and visitor vehicles)

Park Partners TDM program

	1	2	3	4	5	6	7	8	9
	season	vehicles				amount per pass (\$5 per week)		number of months	sub-total revenue \$
1	peak	150				\$20		4	\$12,000
2	shoulder	150				\$20		3	\$9,000
3	off-peak	100				\$20		5	\$10,000
	<b>Sub-Total</b>								<b>\$31,000</b>

#### Category #4: Capehart Housing Rental Revenue

	1	2	3	4	5	6	7	8	9
	units	rent (month) \$	months - year						sub-total revenue \$
1	8	\$2,000	12						\$192,000
3	<b>Sub-Total</b>								<b>\$192,000</b>

**Category #5: Shuttle Fares**

	1	2	3	4	5	6	7	8	9
	passengers (avg. per trip)	daily trips	avg. fare \$	days - year					sub-total revenue \$
1									
2	10	6	\$1	365					\$21,900
3	<b>Sub-Total</b>								<b>\$21,900</b>

**Category 6: General Parking (long-term (annual pass)**

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill,  
Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day	payment \$	vehicles	paid vehicles (9.7% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	annual	N/A	\$1		346	\$40	N./A	N/A	\$13,840
	<b>Sub-Total</b>								<b>\$13,840</b>

**Revenue**

Category #1(daily pass)									\$1,852,200
Category #2 (Battery Spencer meters)									\$0
Category #3 (Long term employee/partner pass)									\$31,000
Category #4 (Capehart Housing Rental)									\$192,000
Category #5 (Shuttle Fares) (lowest number of trips)									\$21,900
Category #6 (Annual Visitor Pass)									\$13,840
<b>Final Total</b>									<b>\$2,110,940</b>

Notes: Peak = Jun. Jul. Aug. Sep. Shoulder = Mar., Apr. May, Oct. Off-peak = Nov. Dec. Jan. Feb.

Category #5 estimates 10 passengers per trip average. If doubled to 20 passengers per trip, or the number of trips doubles (Alt. 3), revenue doubles to \$40,000 annually.

**Expenditures**

Fee Collection staff person (1 full-time = 3FTE's) to empty meters, manage paperwork (GS-9)									\$300,000
Maintenance of equipment / maintenance of housing									\$40,000
Printed Materials and Public Information									\$10,000
<b>Final Total</b>									<b>\$350,000</b>

**Net Total****\$1,760,940**

## Category #1 and Category #6 Revenue Assumptions

<b>Step #1:</b>	7049	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (peak)
	2329	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (peak)
	9378	Total
	5666	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (shoulder)
	1628	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (shoulder)
	7294	Total
<b>Step #2</b>	3750	Use a realistic assumption for off-peak avg. daily vehicle trips (Marin Headlands)
	1000	Use a realistic assumption for off-peak avg. daily vehicle trips (Fort Baker)
	4750	Total
<b>Step #3</b>	9378 * 4	Multiply avg. daily data by 4 for each park season (peak)
	7294 * 4	Multiply avg. daily data by 4 for each park season (shoulder)
	4750 * 4	Multiply avg. daily data by 4 for each park season (off-peak)
<b>Step #4</b>	85688	Add the three seasonal total together to come up with an annual total
<b>Step #5</b>	85688	Divide the annual total by 12 (no. of months)
	12	
<b>Step #6</b>	7141	Divide the total again by 2 (parking = 1/2 number of trips since a car can only park one time, but it takes an inbound and an outbound trip to complete a park visit)
<b>Step #7</b>	3570	At the completion of Step #5, the average daily vehicle number of trips (reduced by 50%) number is reached. This number is the potential number of vehicles (prior to other subtractions) AFTER AVERAGING that would park in these park areas 365 days a year
		Marin Headlands = 2,744 Fort Baker = 826
<b>Step #8</b>	2744	Marin Headlands daily vehicles (F1-3 in NN Report: Data Collection Analysis)
	826	Fort Baker daily vehicles (F1-12 in NN Report: Data Collection Analysis)
	3570	Total
<b>Step #9</b>	3570	Total Marin Headlands - Fort Baker Vehicles Starting Point
	-905	Subtract Battery Spencer (no parking charges at this site)
	2665	Revised Total
<b>Step #10</b>	2665	Split Revised Total into First Time Visitors (40%) and Repeat Visitors (60%)
	1065	First Time Visitors
	1540	Repeat Visitors
<b>Step #11</b>	1065	First Time Visitors
	-53	Subtract Visitors that don't park / park only at visitor center in free parking
	1012	Revised Total First Time Visitors
<b>Step #12</b>	1540	Repeat Visitors
	-154	Subtract 10% of total (assumed volume of staff / volunteers (other parking program)
	-346	Subtract 25% of revised total after Step #5 (visitors who visited 6+ times [NN survey]) because they will likely use an annual pass or multi-use pass (fare media TBD)
<b>Step #13</b>	1040	Revised Total Repeat Visitors
<b>Step #14</b>	2052	Add First Time Visitors and Repeat Visitors revised totals together
<b>Step #15</b>	-677	Subtract an evasion rate of 33%
	1375	Total
<b>Step #16</b>	1375/3570 = 38%	This final number represents the estimated total number of daily vehicles that will pay a parking fee. It means that an estimated 38% of all vehicles entering this part of the park will pay a parking fee.

## Marin Headlands - Fort Baker Roadway Improvements and Transportation Management Plan

### Concept D: Basic Parking Fees (PROJECTED VERY HIGH END)

#### Category 1: General Parking (parking pass)

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill, Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day		vehicles	paid vehicles (28.8% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	peak	weekend	<i>See Appendix A: A series of calculations were developed to obtain a "daily avg." number of vehicles regardless of season, or day of the week.</i>		1029	\$6	8	4	\$197,568
2	peak	weekday			1029	\$6	22	4	\$543,312
3	shoulder	weekend			1029	\$6	8	3	\$148,176
4	shoulder	weekday			1029	\$6	22	3	\$407,484
5	off-peak	weekend			1029	\$6	8	5	\$246,960
6	off-peak	weekday			1029	\$6	22	5	\$679,140
	<b>Sub-Total</b>								<b>\$2,222,640</b>

#### Category #2: Metered Parking (parking meters) (REMOVED FROM CONSIDERATION)

Battery Spencer, Battery Wagner

	1	2	3	4	5	6	7	8	9
	season	type of day	use level at site (assumes 50 metered spaces)	hours of operation	paid vehicles (50% return)	amount paid (50c per 15") \$	days of month	number of months	sub-total revenue \$
7	peak	weekend	90%	0	22.5	\$2	8	4	-
8	peak	weekday	90%	0	22.5	\$2	22	4	-
9	shoulder	weekend	80%	0	20	\$2	8	3	-
10	shoulder	weekday	80%	0	20	\$2	22	3	-
11	off-peak	weekend	50%	0	12.5	\$2	8	5	-
12	off-peak	weekday	50%	0	12.5	\$2	22	5	-
									-

#### Category #3: Long Term Parking Passes (to distinguish between "partner" and visitor vehicles)

Park Partners TDM program

	1	2	3	4	5	6	7	8	9
	season	vehicles				amount per pass (\$6 per week)		number of months	sub-total revenue \$
1	peak	150				\$24		4	\$14,400
2	shoulder	150				\$24		3	\$10,800
3	off-peak	100				\$24		5	\$12,000
	<b>Sub-Total</b>								<b>\$37,200</b>

#### Category #4: Capehart Housing Rental Revenue

	1	2	3	4	5	6	7	8	9
	units	rent (month) \$	months - year						sub-total revenue \$
1	8	\$2,000	12						\$192,000
3	<b>Sub-Total</b>								<b>\$192,000</b>

**Category #5: Shuttle Fares**

	1	2	3	4	5	6	7	8	9
	passengers (avg. per trip)	daily trips	avg. fare \$	days - year					sub-total revenue \$
1									
2	10	6	\$1	365					\$21,900
3	<b>Sub-Total</b>								<b>\$21,900</b>

**Category 6: General Parking (long-term (annual pass))**

Rodeo Beach, Mitchell Road (Rodeo Lagoon), Pt. Bonita/Battery Alexander, BADM, Hawk Hill,  
Trailhead Lot, Headlands Center for Arts, Visitor Center, Headlands Institute

	1	2	3	4	5	6	7	8	9
	season	type of day	payment \$	vehicles	paid vehicles (9.7% of arriving vehicles) see notes	amount paid \$	days of month	number of months	sub-total revenue \$
1	annual	N/A	\$1		346	\$55	N/A	N/A	\$19,030
	<b>Sub-Total</b>								<b>\$19,030</b>

<b>Revenue</b>									
Category #1 (daily pass)									\$2,222,640
Category #2 (Battery Spencer meters)									\$0
Category #3 (Long term employee/partner pass)									\$31,000
Category #4 (Capehart Housing Rental)									\$192,000
Category #5 (Shuttle Fares) (lowest number of trips)									\$21,900
Category #6 (Annual Visitor Pass)									\$19,030
<b>Final Total</b>									<b>\$2,486,570</b>

Notes: Peak = Jun. Jul. Aug. Sep. Shoulder = Mar., Apr. May, Oct. Off-peak = Nov. Dec. Jan. Feb.

Category #5 estimates 10 passengers per trip average. If doubled to 20 passengers per trip, or the number of trips doubles (Alt. 3), revenue doubles to \$40,000 annually.

<b>Expenditures</b>									
Fee Collection staff person (1 full-time = 3FTE's) to empty meters, manage paperwork (GS-9)									\$300,000
Maintenance of equipment / maintenace of housing									\$40,000
Printed Materials and Public Information									\$10,000
<b>Final Total</b>									<b>\$350,000</b>

<b>Net Total</b>	<b>\$2,136,570</b>								
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### Category #1 and Category #6 Revenue Assumptions

<b>Step #1:</b>	7049	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (peak)
	2329	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (peak)
	9378	Total
	5666	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-3 for Marin Headlands (shoulder)
	1628	Use NN Report Data (avg. daily vehicle trips - see Fig. 1-12 for Fort Baker (shoulder)
	7294	Total
<b>Step #2</b>	3750	Use a realistic assumption for off-peak avg. daily vehicle trips (Marin Headlands)
	1000	Use a realistic assumption for off-peak avg. daily vehicle trips (Fort Baker)
	4750	Total
<b>Step #3</b>	9378 * 4	Multiply avg. daily data by 4 for each park season (peak)
	7294 * 4	Multiply avg. daily data by 4 for each park season (shoulder)
	4750 * 4	Multiply avg. daily data by 4 for each park season (off-peak)
<b>Step #4</b>	85688	Add the three seasonal total together to come up with an annual total
<b>Step #5</b>	85688	Divide the annual total by 12 (no. of months)
	12	
<b>Step #6</b>	7141	Divide the total again by 2 (parking = 1/2 number of trips since a car can only park one time, but it takes an inbound and an outbound trip to complete a park visit)
<b>Step #7</b>	3570	At the completion of Step #5, the average daily vehicle number of trips (reduced by 50%) number is reached. This number is the potential number of vehicles (prior to other subtractions) AFTER AVERAGING that would park in these park areas 365 days a year Marin Headlands = 2,744 Fort Baker = 826
<b>Step #8</b>	2744	Marin Headlands daily vehicles (F1-3 in NN Report: Data Collection Analysis)
	826	Fort Baker daily vehicles (F1-12 in NN Report: Data Collection Analysis)
	3570	Total
<b>Step #9</b>	3570	Total Marin Headlands - Fort Baker Vehicles Starting Point
	-905	Subtract Battery Spencer (no parking charges at this site)
	2665	Revised Total
<b>Step #10</b>	2665	Split Revised Total into First Time Visitors (40%) and Repeat Visitors (60%)
	1065	First Time Visitors
	1540	Repeat Visitors
<b>Step #11</b>	1065	First Time Visitors
	-53	Subtract Visitors that don't park / park only at visitor center in free parking
	1012	Revised Total First Time Visitors
	1540	Repeat Visitors
<b>Step #12</b>	-154	Subtract 10% of total (assumed volume of staff / volunteers (other parking program)
<b>Step #13</b>	-346	Subtract 25% of revised total after Step #5 (visitors who visited 6+ times [NN survey]) because they will likely use an annual pass or multi-use pass (fare media TBD)
	1040	Revised Total Repeat Visitors
<b>Step #14</b>	2052	Add First Time Visitors and Repeat Visitors revised totals together
<b>Step #15</b>	-677	Subtract an evasion rate of 33%
	1375	Total
<b>Step #16</b>	1375/3570 = 38%	This final number represents the estimated total number of daily vehicles that will pay a parking fee. It means that an estimated 38% of all vehicles entering this part of the park will pay a parking fee. When applied to Concept D the remaining total vehicles were separated into visitors that were assumed to pay a daily fee (75%) and visitors that would pay by using a long-term pass (25%). Therefore, an estimated 346 visitors (9.7% of entering vehicles) were assumed to pay using a long-term pass and 1,029 vehicles (28.8% of entering vehicles) were assumed to pay using a daily parking fee.



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## **Marin Headlands – Fort Baker Transportation Management Plan (MH-FB TMP) DRAFT Plan for Car Free Zones on Pre-Selected Days in the Marin Headlands and Fort Baker**

### **Car Free Zones and Days**

#### **The Purpose of Car-Free Zones / Days**

A key element of the Marin Headlands – Fort Baker Transportation Management Plan (MH-FB TMP) is one that proposes to establish “Car-Free-Zones on Pre-Selected Days” within the Marin Headlands and Fort Baker. The concept would require that the majority of personal vehicles would be restricted from entering certain pre-determined zones in the Marin Headlands and Fort Baker on certain pre-selected days. The overall purpose of this concept is twofold. First it is to provide park visitors a limited opportunity to experience areas of the park with minimal or no interference due to private vehicles. Enhanced hiking and bicycling opportunities are envisioned throughout the park areas. Second it is to encourage park visitors to visit the park and travel within the park using alternate transportation modes (transit, hiking, bicycling and equestrian). Although the two purposes overlap significantly, they do possess big differences.

#### **Car Free Zone and Dates Proposed Program**

As conceptualized, the Car-Free Zones would be limited to one Sunday day per month, and at least initially, the season would extend only between April and October (7 months).

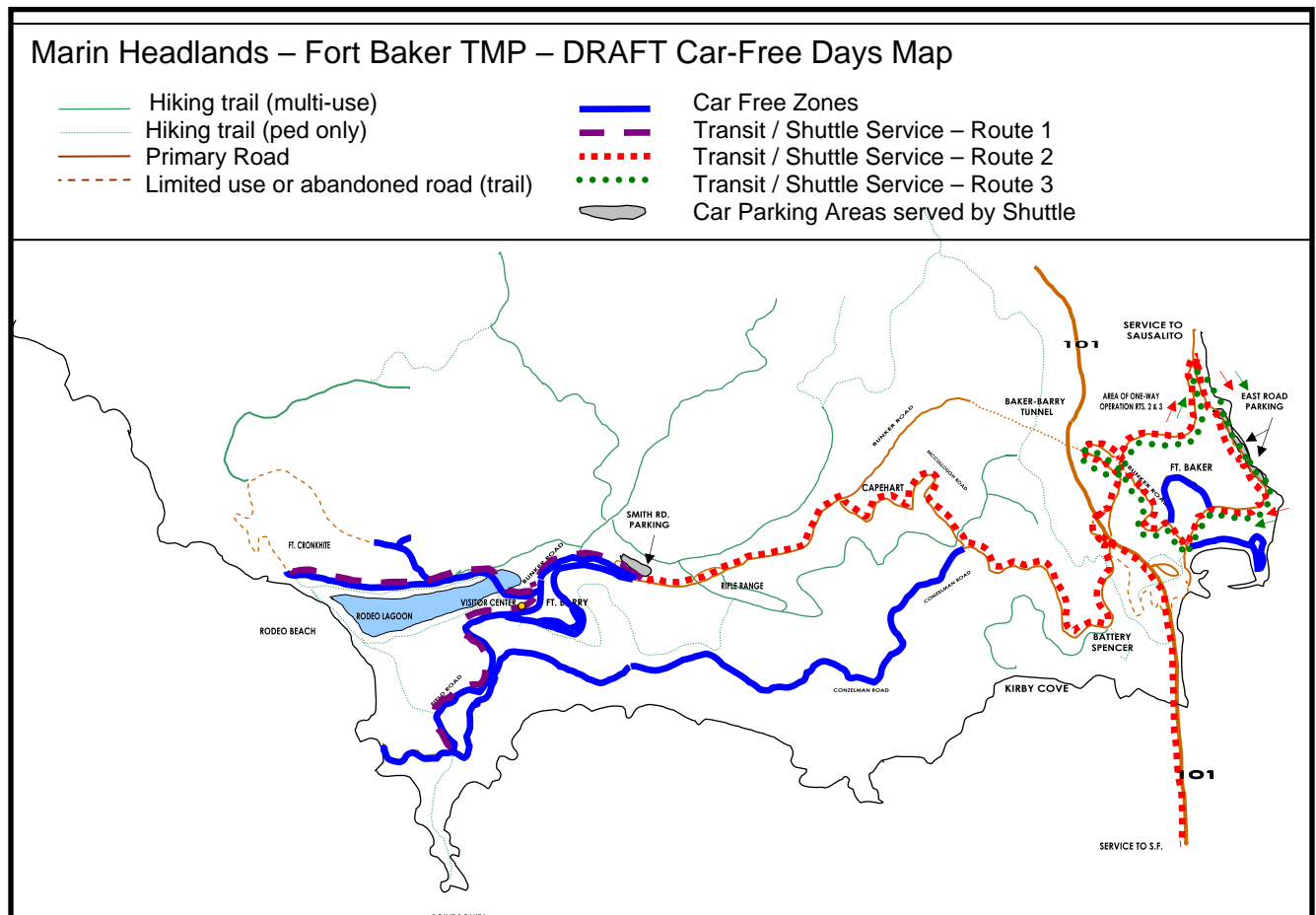
Implementation of Car-Free Zones on Pre-Selected Days would be coordinated with an extensive public information campaign both to provide notice to the visiting public that the special operation will be in effect, and to explain the rationale and benefits of a car-free park experience. Care would also be taken to not schedule the Car-Free days on the days of other special events (e.g. NIKE Missile Site open houses, Art Center events etc.). Expanded transit/shuttle service within the park would be provided to assist park visitor mobility in the car-free zone sections of the park.

Although several concepts were discussed by park staff and the general public, the following concept was selected by park staff for consideration as part of the draft environmental impact statement (DEIS).

In the Marin Headlands the car-free zone would consist of Bunker Road between a car-free days parking area on the Smith Road loop off of Bunker Road and the western terminus of Bunker Road at the Marine Mammal Center Service Road, the Marine Mammal Center Service Road, the entire length of Mitchell Road through Fort Cronkhite from the intersection of Bunker Road to Rodeo Beach, the interior service roads within Fort Cronkhite, the entire length of Field Road, Conzelman Road between McCullough Road and Field Road, and the entire length of both Rosenstock Road and Simmonds Road through Fort Barry.

In Fort Baker, the car-free zone would consist of Murray Circle, plus the local roads and streets located above Murray Circle within the historic housing area that is to be occupied by the Fort Baker Retreat and Conference Center, with one-way traffic operation southbound along East Road, Center Road, and Bunker Road to Danes Drive. The result of these changes would require all park visitors to enter Fort Baker via East Road and exit via Bunker Road to Danes Drive.

Both in the Marin Headlands and in Fort Baker private vehicle entry to access the car-free areas would be allowed, but the access would be very limited (public transit vehicles, shuttle buses, residents' vehicles, service vehicles, certain Park Partner vehicles, and other vehicles as deemed necessary by NPS field staff on site at the time of the closure), and it is expected that many visitors will be required to park at formal and informal lots along Smith Road and the grass area northeast of the Rifle Range in the Marin Headlands and along East Road in Fort Baker. A map showing the car-free zones, transit and shuttle services and primary parking areas is shown below.



Car-free zones are proposed for some of the key areas of significant visitor use in the Marin Headlands, including Conzelman Road at Hawk Hill (Hill 129), along the scenic one-way section of Conzelman Road west of Hawk Hill, the main

cantonments (centers) of Forts Baker, Barry and Cronkhite, Rodeo Beach, the Pt. Bonita Light House, the Nike Missile Site, Bird Island Overlook, and the Marin Headlands NPS Visitor Center.

At the current time in the Marin Headlands the parking supply is estimated to be 1,593 spaces. Parking observations collected by Nelson Nygaard Consultants in 2000 showed a maximum occupancy in the range of 320-350 vehicles at one time in the peak season. Admittedly, many of the spaces are roadside shoulder spaces not located near any park attractions and others are in parking lots that also not located near any park attractions. Therefore even though there appears to be a large abundance of parking spaces, overflows have occurred at the Rodeo Beach Lot, the Point Bonita Lighthouse Trailhead, at Battery Spencer and other Golden Gate Bridge overlooks on Conzelman Road. If a car-free zone were implemented using the current parking setup in the Marin Headlands 520 spaces would remain accessible and 1,073 spaces would be removed by the car-free zone designation.

Under the selected internally preferred alternative, Alternative 3, it is proposed to reduce the overall number of parking spaces in the Marin Headlands to approximately 1,350 spaces, with the largest reductions being proposed for Mitchell Road, parts of Conzelman Road, and Field/Mendell Roads. A large increase (approximately 200 spaces) is proposed for Smith Road near the intersection with Bunker Road. If a car-free zone were to be implemented using the current revised preliminary parking proposal approximately 520 spaces would remain accessible, and 830 spaces would be removed by the car-free designation.

Car-Free Zones or reduced access is proposed for areas in Fort Baker including, Murray Circle and most of the streets and road behind Murray Circle in the rear area on the west side of the Fort Baker cantonment, Saterlee Road and Somerville Road (the cove area) and interior streets and roads adjacent to the Presidio Yacht Club and Battery Cavallo. One-way traffic is proposed in the southbound direction along East Road to allow for additional visitor parking that would be obtained by parking vehicles parallel in a closed northbound lane. This operation would require any regular scheduled transit service provided by Golden Gate Transit to modify their northbound route to enter and exit Fort Baker on these days via Bunker Road, and continue north via Alexander Avenue where buses would rejoin the regular route at the intersection of Alexander Avenue and East Road just south of the Sausalito city limits. The one-way road setup on East Road would also apply to any type of regular schedule park shuttle service or special shuttle service in place for these events.

At the current time the Fort Baker parking is estimated to be 961 spaces. This very large total includes spaces located on Murray Circle and along the narrow streets and housing above the Fort Baker cantonment (approximately 300 spaces), spaces located adjacent to the Coast Guard station (30 spaces), spaces located along Somerville Road (the cove area) and adjacent to the Presidio Yacht Club and near Battery Cavallo, spaces near Lime Point and the Fishing Pier (155 spaces between both areas), spaces within the general Fort Baker area, including parking along

Bunker Road near Bldg. 407, and along Center Street used primarily by the Bay Area Discovery Museum (approximately 235 spaces), and parking along East Road (approximately 125 spaces).

The Fort Baker Plan that was approved in 2001 included major reconfigurations to parking spaces in Fort Baker. The Fort Baker Plan and proposed changes in parking contained within the MH-FB TMP will result in approximately 950-1000 spaces overall being available in Fort Baker and along access roads leading to Fort Baker, of which slightly more than half (about 495-545) will be available to the general public. The remainder of the spaces (up to 455 spaces) will be within the Fort Baker Retreat and Conference Center. Many of these spaces along the cove area near the waterfront, Battery Cavallo, the Fishing Pier, Lime Point, and near the Coast Guard station will be reconfigured and the overall number will be reduced as part of the implementation of the approved Fort Baker Plan and due to Homeland Security safety precautions, although the actual number of spaces proposed to be built is not listed in the Fort Baker Plan.

As per the same plan, parking along Center Street (primarily used by BADM visitors) (120 spaces – parade ground lot and 60 spaces Breitling Avenue lot) will be relocated and rehabilitated (see Fort Baker Plan), and the overall number of spaces will increase to 240 spaces. As of 2004 the Breitling Avenue lot has been removed. As per the proposed changes in the MH-FB TMP, East Road parking will be reconfigured and the number of available spaces is expected to decrease from an estimated 125 spaces to 58 spaces, although the proposed closure of one lane of traffic and one-way traffic operation will allow for 190 spaces in this area during Car Free Zones operation.

Finally the spaces located along Murray Circle and on the streets above in the cantonment will be removed from general visitor parking for use by the Retreat and Conference Center, or will no longer be used for parking at all. The Fort Baker Plan states this area is to contain no more than 455 spaces for all uses (visitors, staff, etc.).

Upon completion of the extensive changes listed above, the number of available parking spaces available to visitors during Car Free Zones operations will be limited to parking along one closed lane of traffic and turnouts on East Road (190 spaces), parking located along Center Street and Bunker Road (approximately 50 spaces), and parking at the lots that are open to all visitors, but which are supposed to be used primarily by BADM visitors (240 spaces). This new total for Car Free Zones operation is approximately 480 spaces, of which 142 spaces will be created for the special event only. Therefore of a total of approximately 500-550 spaces open to the general public on non-Car Free Zones Days, about 338-388 will be available on Car Free Zones Days. (This assumes parking on Murray Circle, at the waterfront, at Lime Point, at the Fishing Pier, and at the Coast Guard Station is not available.)

### **GGNRA 1980 General Management Car Free Zone Plan**

The GGNRA 1980 General Management Plan (GMP) envisioned the creation of a car-free zone in the western edge of Fort Cronkhite. This was to be accomplished by the relocation of the Rodeo Beach parking lot located at the western edge of Fort Cronkhite to an area occupied by several non-World War II vintage buildings on the eastern edge of Fort Cronkhite, following the removal of what were then considered to be non-historic buildings. Today, these buildings are occupied by the non-profit Headlands Institute, a key park partner, and are now considered to be historic. Due to their ongoing use and present historic status, the relocation of parking and creation of a car-free zone at this site, as proposed in the 1980 GMP, a different plan described above has been developed as a draft alternative.

### **Draft Proposed Operations Plan Overview and Staffing Issues**

The mechanism for implementation of the car-free zone would likely consist of placement of temporary barriers across roadways at the entrance to car-free road segments by NPS staff along with applicable signage explaining the car-free concept including boundaries, available transit/shuttle service and hours of operation.

A large NPS staff presence would certainly be required, especially during any pilot project or during an initial period of implementation. Staff would be needed at physical barriers that would be in place across two major roads in the Headlands (Conzelman Road at the intersection with McCullough Road, and Bunker Road just west of Smith Road), across one road in Fort Baker (Murray Circle), and to manage one-way traffic operations that will be in place along East Road north of Center Street. Staff would also need to be in place at Smith Road to assist with shuttle bus operations, and they may be needed or an option to ride on the shuttle buses providing information and performing interpretation. Once the program were to become more established, staff presence would be less likely to be needed.

As discussed earlier, the initial proposed dates of operation of a car-free zone program are one Sunday per month between April and October, for a total of seven car-free zone days in one year. The initial proposed times of operation are from 6:00 A.M. – 6:00 P.M. Dependent upon the success of the program, the National Park Service may adjust the number of car-free zone days and may adjust the implementation times.

### **Car Free Zones and Days as an Element of the Alternatives**

The concept of Car Free Zones on Pre-Selected Days is not an element found in Alternative 1 (No Action) or Alternative 2 (Basic Access), but the concept as explained above is an element in Alternative 3 (Enhanced Access) and Alternative 4 (Maximum Access). Alternative 3 (Enhanced Access) was selected as the agency preferred alternative in a workshop in July 2004.

### **Transit Service and Shuttle Service Description for MH-FB Car-Free Zone**

The proposed Car Free Zones concept would allow for regular operation of any existing transit services provided to this part of the park by Golden Gate Transit and S.F. MUNI both on roads that are open to general vehicle traffic and on roads that

are closed to vehicle traffic. The transit service is envisioned to play a significant role along with the special shuttles in providing mobility and access for park visitors that would leave their car at one of the remote parking lots.

In addition to the SF Muni and Golden Gate Transit service, the proposed shuttle service would consist of three routes and provide transit along Bunker Road between remote parking areas in Rodeo Valley on Bunker Road at Smith Road (old housing area) and the northern tip of the Rifle Range (current parking area) in both directions to serve popular destinations of Rodeo Beach / Fort Cronkhite, the Pt. Bonita Lighthouse, the Nike Missile Site, Visitor Center, Capehart Housing, Battery Spencer Overlook, and several sites in Fort Baker. The two primary shuttles are conceptually envisioned to be mostly parallel services with service being offered in both directions simultaneously, although the eastern portion of the largest shuttle (connection between Marin Headlands and Fort Baker) requires a one-way loop through Fort Baker. The third shuttle will be a Fort Baker one-way circle route shuttle only. Shuttles are to use the same stops as regular transit service where possible. A service operator has not been determined for this conceptual service. Possible operation options include: 1) NPS ownership of equipment and operation, 2) NPS ownership of equipment combined with operations provided by a private or public transit service per a lease agreement, 3) equipment ownership and operations provided by a public or private transit service per a lease agreement.

Eastward the primary shuttle route that would connect the Marin Headlands to Fort Baker would operate to Fort Baker along an alignment consisting of Bunker Road to Capehart Housing, McCullough Road, Conzelman Road between the intersection with McCullough Road and Alexander Avenue Alexander Avenue to East Road, East Road (southbound only), Center Street (southbound only), Murray Circle (westbound only), the east section of Bunker Road between the Baker-Barry Tunnel and Murray Circle (westbound only), Danes Drive (eastbound only).

Westward from the remote parking areas in Rodeo Valley at Smith Road and the tip of the Rifle Range, the Marin Headlands shuttle would serve Fort Cronkhite along an alignment consisting of Bunker Road to Mitchell Road to Rodeo Beach, and it would serve the NPS Visitor Center, Nike Missile Site, Pt. Bonita Lighthouse and the Bird Island Overlook via Bunker Road, Field Road and Mendell Road.

The Fort Baker one-way circle route shuttle would operate in a clockwise loop starting from near the Bay Area Discovery Museum via Center Street, Murray Circle, East Bunker Road, Danes Drive, Alexander Avenue, East Road and back to the start point.

### **Cost Estimation Worksheet for MH-FB Car-Free Zone Shuttle**

The proposed Car Free Zones plan is expected to have significant operations issues and costs that will have to be borne by the National Park Service. The majority of these costs are expected to be focused in three areas: 1) provision of special shuttle bus service, and 2) provision of adequate staff, and 3) provision of adequate supplies and preparatory activities to ensure a successful and well-run special event.

## Shuttle Costs

The shuttle service costs are estimated below, and are based upon standard transit service estimation elements. As explained earlier, three shuttle routes are proposed: 1) a 'Y' shaped route to serve the western end of the Marin Headlands with one leg operating via Field Road, a second leg operating to Rodeo Beach / Fort Cronkhite via Bunker Road and Mitchell Road, and the third leg operating via Bunker Road to the road closure at the Smith Road parking area, 2) a longer route operating between the Marin Headlands and Fort Baker, utilizing portions of Bunker Road, McCullough Road and Conzelman Road. The service would serve Battery Spencer and the Trailhead Lot. It would not operate through the Baker-Barry Tunnel, and 3) a one-way circle route to serve Fort Baker only.

The cost elements are covered in greater detail below.

### Route 1

Location	Distance
Smith Rd. - Bird Island Overlook	1.62
Bird Island Overlook to Field/Bunker Intersection (Wye)	1.26
Wye to Rodeo Beach	1.08
Rodeo Beach to Wye	1.08
Wye to Smith Road	0.18
Total Round Trip Distance	5.22

Distance	Speed	Run Time	Recovery Time	Cycle Time	Frequency	Buses
5.22	20.0	16	4	20	10	2
	17.5	18	12	30	10	3
	15.0	21	9	30	10	3

Buses	Service Hours	Cost per Hr.	Number of Days	Total Estimated Cost
3	12	\$85	7	\$21,420
3	12	\$100	7	\$25,200
3	12	\$115	7	\$28,980

Route 1 would operate as a shuttle along both Field Road and Bunker Road /Mitchell Road segments. An average speed of 15.0 mph is probably the most likely speed of the speeds calculated. If the service operates on a 10 minute frequency, 3 buses would be required to operate the service.

The estimated cost of this service package ranges from \$3,060 - \$4,140 per day or \$21,420 – to \$28,980 annually. The revised costs per hour reflect recent adjustments by regional public transit carriers in 2004.



## Route 2

Location	Distance
Smith Road to Capehart (Bunker/McCullough Intersection)	1.08
Capehart to McCullough/Conzelman Intersection)	0.90
McCullough/Conzelman Intersection to Trailhead Lot	1.08
Trailhead Lot to Alexander Ave./Danes Drive intersection	0.20
Alexander Ave.: Danes Dr. intersection to East Rd. intersection*	0.75
East Road to Center Street intersection*	0.85
Center Street /East Road intersection to Murray Circle*	0.10
Murray Circle between Center Street and East Bunker Road*	0.04
East Bunker Road between Murray Circle and Danes Drive*	0.61
Danes Drive between East Bunker Road and Alexander Avenue*	0.10
Alexander Ave.: Danes Dr. intersection to Trailhead Lot	0.20
Trailhead Lot to McCullough/Conzelman Intersection	1.08
McCullough/Conzelman to Capehart	0.90
Bunker/McCullough Intersection (Capehart) to Smith Road	1.08
Total Round Trip Distance	8.97

Route 2 would operate as a shuttle along part of Bunker Road, McCullough Road, part of Conzelman Road, part of Alexander Avenue, East Road, Center Street, part of Murray Circle, East Bunker Road, Danes Drive, Alexander Avenue, Conzelman Road, McCullough Road, and Bunker Road. An average speed of 15.0 mph is probably a likely speed of the speeds calculated. If the service operates on a 10 minute frequency, 5 buses will be required to operate the service.

Distance	Speed	Run Time	Recovery Time	Cycle Time	Frequency	Buses
8.97	20.0	27	13	40	10	4
	17.5	31	9	40	10	4
	15.0	36	14	50	10	5

Buses	Service Hours	Cost per Hr.	Number of Days	Total Estimated Cost
5	12	\$85	7	\$35,700
5	12	\$100	7	\$42,000
5	12	\$115	7	\$48,300

The estimated cost of this service package ranges from \$5,100 – \$6,900 per day or \$35,700 - \$48,300 annually. The revised costs per hour reflect recent adjustments by regional public transit carriers in 2004.

A shorter version of Route 2 that would not operate east of the Trailhead Lot and down into Fort Baker has also been discussed, but it is not shown here. The impacts from the longer route will address impacts caused by the shorter route.

### Route 3

#### Location

Center Street /East Road intersection to Murray Circle*	0.10
Murray Circle between Center Street and East Bunker Road*	0.04
East Bunker Road between Murray Circle and Danes Drive*	0.61
Danes Drive between East Bunker Road and Alexander Avenue*	0.10
Alexander Avenue between Danes Drive and East Road*	0.75
<u>East Road between Alexander Avenue and Center Street*</u>	<u>0.85</u>
Total Loop Trip Distance	2.45

Route 3 would operate as a Fort Baker Shuttle and is necessitated by the proposed adoption of one-way traffic (southbound) along East Road. In order to continue to provide shuttle service for visitors that either park along this road or desire to visit this part of Fort Baker, a one-way loop shuttle is required. The route would operate along Center Street, Murray Circle, East Bunker Road, Danes Drive, Alexander Avenue, and East Road – completing the loop on Center Street. Although proposed shuttle Route 2 would also serve this area, it is unrealistic to expect visitors will board the shuttle in Fort Baker and then ride far west to the Marin Headlands before the same shuttle returned to the east side of the park and served the East Road area. An average speed of 15.0 mph is probably the most likely speed of the speeds calculated for Shuttle Route 3. If the service operates on a 15 minute frequency, 1 bus would be required to operate the service. Although this frequency is less than the other two routes, ridership is envisioned to be much less on this route, so a 15 minute frequency should be adequate.

Distance	Speed	Run Time	Recovery Time	Cycle Time	Frequency	Buses
2.45	20.0	8	2	10	15	1
	17.5	9	6	15	15	1
	15.0	10	4	15	15	1

Buses	Service Hours	Cost per Hr.	Number of Days	Total Estimated Cost
1	12	\$85	7	\$7,140
1	12	\$100	7	\$8,400
1	12	\$115	7	\$9,660

The estimated cost of this service package ranges from \$1,020 – \$1,380 per day or \$7,140 - \$9,660 annually. The revised costs per hour reflect recent adjustments by regional public transit carriers in 2004.

A combined operation of Routes 1, 2 and 3 would allow shuttle coverage of both the Marin Headlands and Fort Baker, and provide for a direct connection between the two sites via the shuttle services. The estimated cost of this service package ranges

from \$9,180 - \$12,420 per day or \$64,260 - \$86,940 annually for the seven car free days of service.

### **NPS Staff Costs**

The provision of adequate NPS staff to implement this special event is a very important factor. At the current time a fully drafted operations plan has not been developed. However, initially it is safe to assume with the number of proposed road closures, one-way operation along East Road, and special shuttle services that approximately 25 additional NPS staff will be required for each event during the first season of operation. It can be assumed that if Car Free Zones is determined to be a park event that GGNRA desires to implement on a regular basis that the initial staff needs will decline over time. An estimate of the reduced need for staff once the park became familiar with Car Free Zones type of operation is not possible here. An estimated breakdown of the initial staff costs is shown below. The numbers of staff do not reflect the total number of staff that would be in the field at any one time, but the staff requirements for an entire day. As this event would last for 12 hours, and is likely to require set up time and break down time on the day of the event, the actual working day is likely to be 14-16 hours for staff in the field, which means staff will either need to be paid overtime (not assumed here), or two staff may be needed to fill one position for the course of the event (assumed here).

NPS Staff	Work Hours	Avg. Salary		
10 protection rangers	80	GS-7-5 (SF Bay) 20.98 hr.		
7 interpretation / general rangers	48	"	"	"
1 public affairs staff	8	"	"	"
1 planning staff	8	"	"	"
4 maintenance staff	24	"	"	"
2 special park uses division rangers	16	"	"	"
25 NPS staff (FTE)	200 Hours	X	20.98 hr	= \$4,196

### **Preparatory Costs and Supplies**

Additionally, preparatory work will need to be done: training of staff that will be in the field, the creation and distribution of public information (print media, news media, website, etc.), the acquisition of any supplies (i.e. barricades, roadway cones, etc.), etc. Some of these costs will be one time costs and others will be amortized over the period of a season (April – October) or over a period of years. An estimation of the other preparatory needs can vary greatly depending upon the proposed extent of public outreach and the media type(s) selected. As a placeholder for this paper, preparatory costs not associated with staff will be estimated at \$5,000 per event.

Therefore, when the three totals of 1) shuttle service, 2) NPS staff costs and 3) other preparatory costs are added up, it is estimated that the implementation of Car Free Zones would cost \$18,376 – \$21,616 per day, or \$128,632 - \$151,312 in 2004 costs annually for seven car free days of operation.

Once again, this is a preliminary estimate of costs associated with this proposal. GGNRA has already determined that any application of a Car-Free Zones day will

be performed on a pilot-project basis, and a full and detailed operations and financial plan will be worked out in well in advance of actual implementation.

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### **Transportation Data**

1. Traffic Analysis for Marin Headlands/Fort Baker DEIS
2. Revised Auto-Reduction Analysis for MH/FB TIMP EIS  
(Nelson/Nygaard)
3. Golden Gate National Recreation Area Parking Analysis
4. Golden Gate National Recreation Area Car Free Day Parking  
Analysis (Alternatives 3 and 4)
5. High Motor Vehicle Traffic Accident Locations and Safety  
Improvement Prescriptions (table and map)



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## MEMORANDUM

**DATE:** March 29, 2004  
**TO:** Debra Perkins-Smith  
**FROM:** Stacy Tschuor, PE  
**SUBJECT:** Traffic Analysis for Marin Headlands/Fort Baker DEIS  
**PROJECT:** Marin Headlands/Ft. Baker Roadway Infrastructure and Transportation Management Plan

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This memorandum summarizes the results of the traffic volume and Level of Service (LOS) analysis for the Marin Headlands/Fort Baker DEIS. The analysis includes our estimation of traffic volumes on key roadway segments and capacity analysis at intersections and roadways within the Park. Note that a formal travel demand model was beyond the scope of our analysis. We factored and redistributed traffic volumes on each roadway segment considering the expected impact of the alternatives on the vehicular traffic.

### Traffic Volumes

#### Existing Traffic Volumes

Traffic forecasts for the Golden Gate National Recreation Area (GGNRA) are based on traffic counts collected in Summer 2000 documented in the Transportation Management Plan for the Marin Headlands and Fort Baker Data Collection Analysis (December 2001). Locations for the traffic volume estimates were selected based upon the roadway's importance to the roadway network, its relevance to the Park's main entrances and exits and its importance in serving Park destinations. Daily traffic volumes were calculated for the following roadway segments:

- Conzelman Road/Lower Conzelman Road:
  - Alexander Avenue to Battery Spencer
  - Battery Spencer to McCullough Road
  - McCullough Road to Hawk Hill
  - Hawk Hill to Field Road
- McCullough Road – Conzelman Road to Bunker Road
- Danes Drive – Tunnel to Alexander Avenue
- Barry-Baker Tunnel
- Bunker Road:
  - West Tunnel to McCullough Road
  - McCullough Road to Field Road
  - West of Field Road
- Field Road/Mendell Road - Bunker Road to Bird Rock Overlook
- Bunker Road East – East Tunnel to Fort Baker
- East Road – Fort Baker to Alexander Avenue
- Alexander Avenue
  - US 101 to Danes Drive
  - Danes Drive to East Road

Not all locations to be analyzed for this project were counted in Summer 2000, so the volumes on some roadway segments were extrapolated from the available data. This was done by using the roadway traffic counts and the peak hour turning movement counts to calculate missing roadway segments. For example, it was estimated in the Transportation Management Plan for the Marin Headlands and Fort Baker Existing Conditions Report (November 2000) that an average of 51 percent of the vehicles entering the Park on a weekend day via Conzelman Road does not continue past Battery Spencer to the McCullough Road intersection. This information was used to estimate the volumes on Conzelman Road between Battery Spencer and McCullough Road (Location 2). Conzelman Road operates as a westbound one-way road west of Hawk Hill, so the traffic volumes west of Hawk Hill (Location 4) were estimated by examining the eastbound and westbound movements counted at the Conzelman Road and McCullough Road intersection. The traffic volume along Field Road south of Bunker Road (Location 11) was estimated by looking at the volumes on the other roadways entering and exiting the Fort Cronkite area.

The existing traffic volumes entering and exiting the Marin Headlands and Fort Baker areas show only a slight seasonal variation between the summer and spring counts, especially over the weekend days, so only peak summer season traffic volumes were calculated for this project. There are large differences between the vehicle counts on the weekdays and weekends. Daily traffic volumes were calculated for the weekend conditions, since that is the worst-case scenario.

### **Non-Recreational Trips**

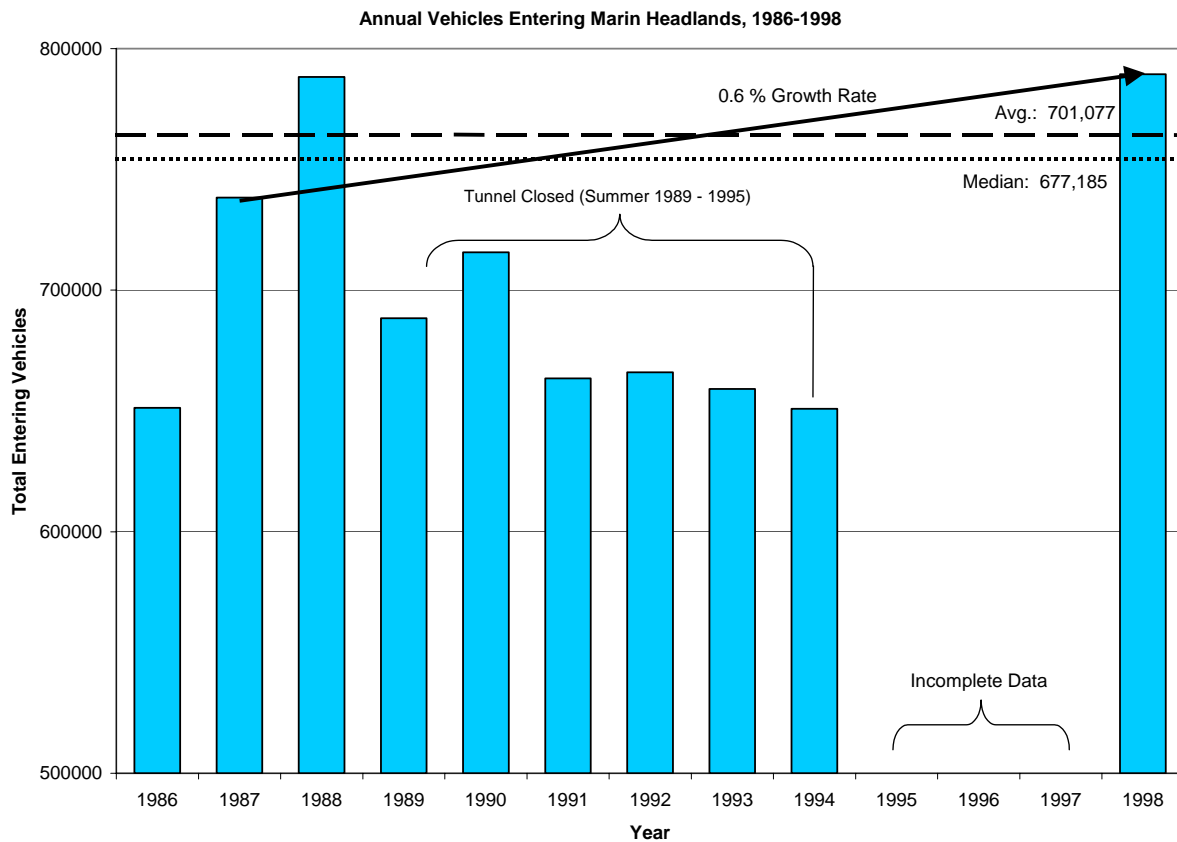
GGNRA is unique in that many of its visitor programs are run by private non-profit Park Partners who occupy the historic military buildings. These partners include a variety of organizations ranging from museums to hostels. Non-recreational trips made by employees of the Park Partners are included in the existing counts accessing the Park. If the number of non-recreational trips is considered significant, these trips should be separated from the recreational trips and a different growth rate should be applied to the volumes based on expected changes in employment.

Non-recreational trips accessing the Park were estimated from employment data collected from the Park Partners. The data, shown in the attached table, includes average number of weekday employees, average number of weekend employees and numbers of employees with on-site housing. Conservative estimates show employee trips from the Marin Headlands and Fort Baker to be less than 5 percent of the existing traffic entering and exiting the recreational area on a weekend day. The Park Partners identified no staff expansion plans that would change these proportions of employee trips in the future. This amount of non-recreational trips is considered negligible to the traffic forecasts for this project and would fall within the normal fluctuations of traffic. Therefore, the non-recreational trips were not projected separately from the general traffic volumes.

### **Traffic Forecasts**

Visitation trends were examined from data presented in the Transportation Management Plan for The Marin Headlands and Fort Baker (March 2002). The annual vehicle counts entering Marin Headlands from 1986 to 1998, shown below, varied widely from year to year and contained several years of incomplete data (1995-1997 and 1999-2000). The Barry-Baker Tunnel was closed during the five years from Summer 1989 to 1995. The volumes have no visible trend over the 12 years. The high and low volume years could be a factor of economic and social conditions, such as weather, local and national economy, regional events and construction. A straight-line projection for a period of over ten years (1987 – 1998) shows a growth rate of 0.6 percent.





The annual vehicle counts entering Fort Baker from 1997 to 2000 show visitation to the area is decreasing, most likely due to base closure. However, these traffic volumes are anticipated to stabilize and likely increase with Fort Baker redevelopment. The Fort Baker Plan EIS shows traffic increases expected on Alexander Avenue, Bunker Road and East Roads with the Proposed Action. Traffic counts were collected along these roadways in Summer 2000.

It is estimated in the Transportation Management Plan for the Marin Headlands and Fort Baker Existing Conditions Report (November 2000) that as much as 73 percent of the northbound and 88 percent of the southbound traffic on Alexander Avenue is unrelated to traffic to or from the Marin Headlands and Fort Baker. Alexander Avenue is a main route into the City of Sausalito as well as Fort Baker. The traffic forecasts for this roadway considered not only the growth rates of the park, but also the historical growth of traffic volumes on Alexander Avenue.

The growth rates assumed for the travel model development outlined in the Comprehensive Transportation Management Plan (CTMP) for Parklands in Southwestern Marin Integrated Travel Model Development and Application Draft Technical Memorandum (October 2002) are 0.5 percent for residents and 0.5 percent for visiting tourists. The growth factor for residents was based on the percentage change in population for Marin County, assuming that the average per-person frequency of visiting the park sites will remain unchanged across the forecast period. The growth rate for visiting tourists was a default assumption. The 2023 recreational travel forecast model results showed an average annual growth rate of 0.5 percent for the weekday and 0.7 percent for the weekend, averaging across the summer, spring and winter seasons.

An annual growth rate of 0.6 percent can be extrapolated from the historical visitation data. This data contains total counts for the year and is not broken down by seasons or weekday and weekends. The CTMP travel model estimates are calculated for the summer, spring and winter seasons and weekdays and weekends. Taking the average across the seasons, the average annual growth rates of 0.5 percent for the weekday and 0.7 percent for the weekend from the travel model are consistent with the historical visitation data.

Nelson\Nygaard staff involved in previous GGNRA and Fort Baker projects have reviewed this memo and agree with the outlined traffic forecast methodology and results. A 0.7 percent weekend growth rate is recommended for this project. This growth rate is consistent with historical traffic data and the CTMP travel model estimates. The rate was applied to the roadway segment traffic volumes calculated from existing counts. The expected traffic volumes from the Fort Baker Proposed Action Fort Baker Plan EIS were added to the traffic forecasts for Year 2023 along Alexander Avenue, Bunker Road and East Road. No adjustments were made to account for non-recreational trips, as they are considered minor in relation to the overall park traffic volumes.

The peak weekend daily traffic volume forecasts for each alternative are summarized in the attached table and figure. The traffic volumes were calculated and redistributed based on the proposed changes to the roadway network, shifts and/or reductions in parking supply and estimated auto-reduction from transit service for each alternative. The auto-reduction factors provided by Nelson\Nygaard in the Auto-Reduction Analysis for Marin Headlands/Fort Baker DEIS memorandum dated February 28, 2004 were used for this analysis. The impact shown in the table for each segment by alternative is defined by the intensity of impact given in the latest Impact Evaluation Methodologies section of the DEIS. Descriptions of the assumptions made for each alternative are provided below.

***Alternative 1 – No Action***

Traffic forecasts were calculated using an annual growth rate of 0.7 percent. Because the roadway network, parking supply and transit service remain the same as existing, no other factors were applied to the traffic volumes on each roadway segment.

***Alternative 2 – Basic Multi-Modal Access***

The auto-reduction factors provided by Nelson-Nygaard for this analysis showed no auto reduction with this alternative. There are two major changes to the roadway network under this alternative that would effect traffic flow within the Park. The Barry-Baker Tunnel operates with one-way eastbound traffic in contrast to the existing two-way traffic with signalized control. All of the westbound tunnel traffic volumes were redistributed to westbound Conzelman Road and northbound McCullough Road. McCullough Road is changed to one-way operation in the northbound direction. All southbound McCullough Road traffic volumes were applied to Bunker Road through the Barry-Baker Tunnel and through the Danes Drive and Alexander Avenue intersection. The traffic flow changes for this alternative were limited to the Conzelman Road–Bunker Road–Alexander Avenue loop. No changes were made to the network west of McCullough Road.

There is a general reduction in parking supply across the Park in Alternative 2. However, the parking occupancies recorded in the Transportation Management Plan for the Marin Headlands and Fort Baker Existing Conditions Report (November 2000) show almost all locations operating under-capacity during a peak season weekend. Therefore, it is believed that the proposed parking reductions with this alternative will have little to no effect on overall parking demand and vehicular volumes. Parking at Battery Spencer is reduced below the existing occupancy. Although this reduction will most likely degrade traffic operations

and safety in the area with drivers trying to get to the few available spaces, it is not expected to lower the amount of traffic trying to access the area and traffic volumes along Conzelman Road were not reduced.

### ***Alternative 3 – Enhanced Multi-Modal Access***

The auto-reduction factors provided by Nelson-Nygaard were applied to the traffic volumes accessing the Park and circulating within the Park. No changes to the roadway network are proposed with this alternative. There is a large reduction in parking with over 20 percent of the existing parking spaces eliminated across the Park. However, some of the additional parking shifts that are proposed with this alternative compared to Alternative 2 occur within the same study roadway segment, such as Field Road and Mitchell Road. The parking reductions proposed at Hawk Hill are believed to have little effect on traffic volumes along Conzelman Road without an active parking management system to inform drivers of a full parking lot prior to passing the McCullough Road intersection.

### ***Alternative 4 – Maximum Multi-Modal Access***

The auto-reduction factors were applied to the traffic volumes accessing the Park and circulating within the Park. Overall parking reductions with this alternative are similar to Alternative 2, in which no changes were made to vehicular volumes. However, with the Park shuttle serving Rodeo Beach and Bird Rock Overlook and a large parking area proposed along Bunker Road at Smith Road in this alternative, reduced traffic volumes were assumed along Mitchell Road and Field Road.

### **Level of Service (LOS)**

Roadway and intersection LOS analysis was performed for five intersections and two roadway segments. Peak hour traffic was estimated at these locations based on existing peak hour percentages and expected alternative traffic distributions. The results are summarized in the table below. The LOS impacts, as defined by the intensity of impact given in the latest Impact Evaluation Methodologies section of the DEIS, are negligible or minor for each alternative.

Intersection/Roadway Segment	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Conzelman Road / McCullough Road	B	A	A	A
Bunker Road / McCullough Road	B	B	B	B
Bunker Road / Danes Drive	B	B	B	A
Alexander Avenue / Danes Drive – <i>Unsignalized</i>	C	D	C	C
Alexander Avenue / Danes Drive – <i>Signalized</i>	-	B	-	B
Alexander Avenue/ US 101 NB Ramps	F	F	F	F
Conzelman Road – US 101 to McCullough Rd	C	C	C	C
Alexander Avenue – Conzelman Rd to Danes Dr	D	D	D	D

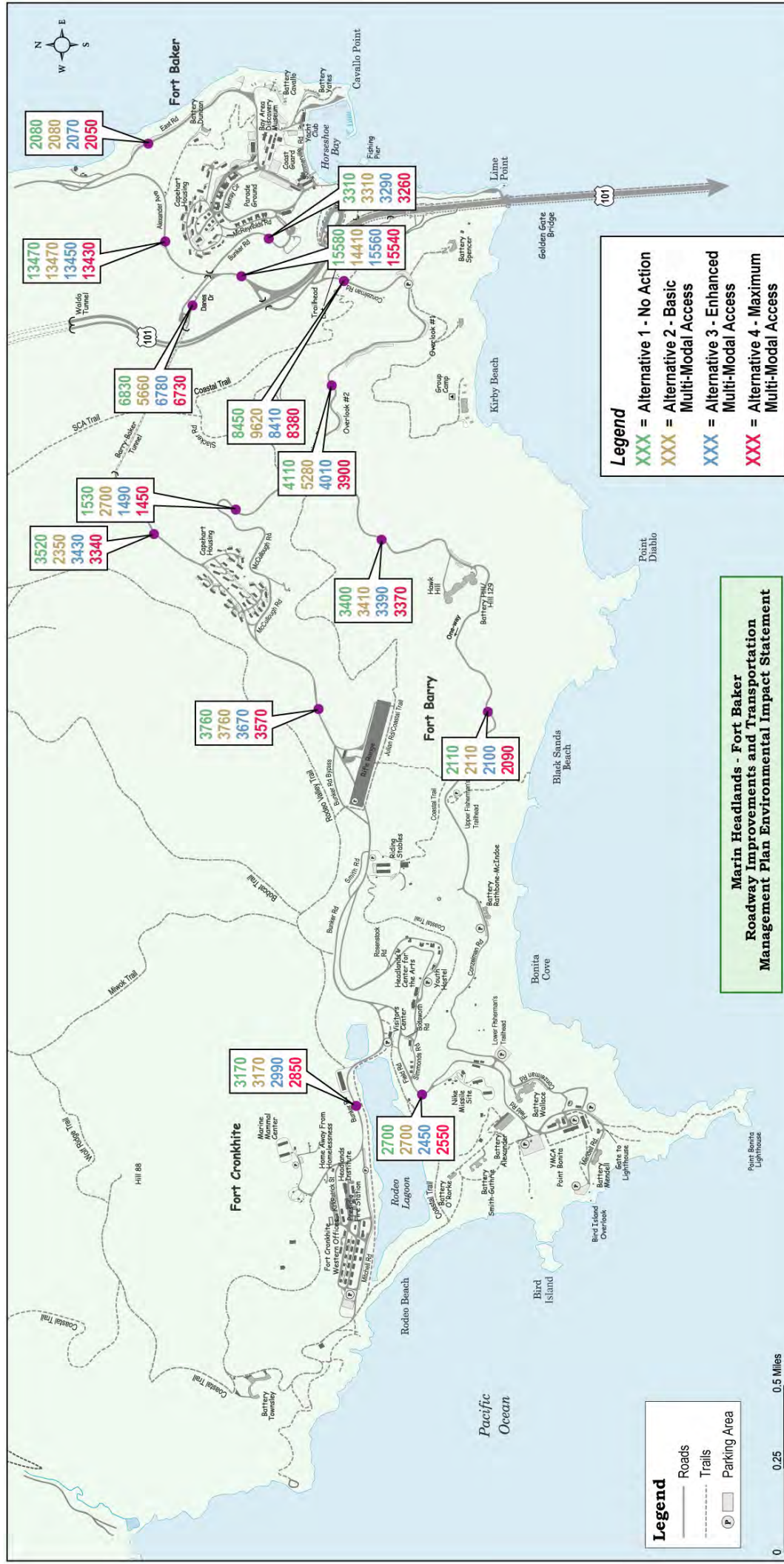
The intersection geometry and control that was assumed for each alternative is consistent with the most current alternatives matrix dated June 25, 2003. The Conzelman Road and McCullough Road intersection is an unsignalized “Tee” intersection in Alternatives 1 and 2 and is a roundabout in Alternatives 3 and 4. The Bunker Road and McCullough Road intersection remains as the existing unsignalized “Y” intersection in Alternatives 1 and is converted to a “Tee” configuration in Alternatives 2, 3 and 4. The Bunker Road and Danes Drive intersection is an unsignalized “Tee” intersection in all alternatives. The Alexander Avenue and Danes Drive intersection is an unsignalized “Y” intersection in Alternative 1, a possible signalized “Tee” intersection in Alternatives 2 and 4 (if signal warrants are met) and an unsignalized “Tee” intersection in Alternative 3. The Alexander Avenue and US 101 Northbound Ramps intersection is an unsignalized “Tee” intersection in all alternatives.

Roadway Segment	Alternative 2					Alternative 3					Alternative 4				
	Existing 2000	Future 2023	No Action 2023	Auto-Reduction		% Change	Impact	Auto-Reduction		% Change	Impact	Auto-Reduction		% Change	Impact
				Volume	Difference			Volume	Difference			Volume	Difference		
1 Conzelman Road	7,200	8,453	8,450												
2 US 101 to Battery Spencer	3,500	4,110	4,110	None	0	13.8%	Negligible	8,410	40	-0.5%	Negligible	8,380	70	-0.8%	Negligible
3 Battery Spencer to McCullough Road	3,100	3,405	3,400	None	0	28.5%	Minor	4,010	100	-2.4%	Negligible	3,900	210	-5.1%	Negligible
4 McCullough Road to Hawk Hill	2,900	3,405	3,400	None	0	0.3%	Negligible	3,390	10	-0.3%	Negligible	3,370	30	-0.9%	Negligible
5 Hawk Hill to Field Road	1,800	2,113	2,110	None	0	0.0%	Negligible	2,100	10	-0.3%	Negligible	2,090	20	-0.9%	Negligible
6 McCullough Road	4,300	5,048	5,040	None	0	76.5%	Major	2,100	10	-0.3%	Negligible	2,090	20	-0.9%	Negligible
7 Conzelman Road to Bunker Road	1,300	1,526	1,530	None	0	76.5%	Major	1,490	40	-2.6%	Negligible	1,450	80	-5.2%	Negligible
8 Danes Drive	4,300	5,048	5,040	None	0	-17.1%	Minor	6,780	50	-0.7%	Negligible	6,730	100	-1.5%	Negligible
9 Tunnel to Alexander Avenue	3,000	3,522	3,520	None	0	-33.2%	Minor	3,430	90	-2.6%	Negligible	3,340	180	-5.1%	Negligible
10 West Tunnel to McCullough Road	3,200	3,757	3,760	None	0	0.0%	Negligible	3,670	90	-2.4%	Negligible	3,570	190	-5.1%	Negligible
11 McCullough Road to Field Road	2,700	3,170	3,170	None	0	0.0%	Negligible	3,090	80	-5.7%	Negligible	3,010	160	-10.1%	Negligible
12 Michael Rd - West of Field Road	2,300	2,700	2,700	None	0	0.0%	Negligible	2,630	70	-9.3%	Negligible	2,570	130	-5.6%	Negligible
13 Field Road	1,300	1,526	3,310	None	0	0.0%	Negligible	3,290	20	-0.6%	Negligible	3,260	50	-1.5%	Negligible
14 Bunker Road to Bird Rock Overlook	1,300	1,526	3,310	None	0	0.0%	Negligible	3,290	20	-0.6%	Negligible	3,260	50	-1.5%	Negligible
15 Bunker Road East	1,300	1,526	3,310	None	0	0.0%	Negligible	3,290	20	-0.6%	Negligible	3,260	50	-1.5%	Negligible
16 East Tunnel to Fort Baker	1,300	1,526	3,310	None	0	0.0%	Negligible	3,290	20	-0.6%	Negligible	3,260	50	-1.5%	Negligible
17 Alexander Avenue	1,600	1,878	2,080	None	0	0.0%	Negligible	2,070	10	-0.5%	Negligible	2,050	30	-1.4%	Negligible
18 Fort Baker to Alexander Avenue	13,100	15,380	15,580	None	0	-7.5%	Negligible	15,560	20	-0.1%	Negligible	15,540	40	-0.3%	Negligible
19 US 101 to Dana Drive	13,100	15,380	15,580	None	0	0.0%	Negligible	15,560	20	-0.1%	Negligible	15,540	40	-0.3%	Negligible
20 Dana Drive to East Road	11,300	13,266	13,470	None	0	0.0%	Negligible	13,450	20	-0.1%	Negligible	13,430	40	-0.3%	Negligible
21 East Road	11,300	13,266	13,470	None	0	0.0%	Negligible	13,450	20	-0.1%	Negligible	13,430	40	-0.3%	Negligible

Expected traffic volumes from the Fort Baker Proposed Action Fort Baker Plan EIS added to the 2023 base forecasts along Alexander Ave, Bunker Rd and East Rd

Traffic volumes redistributed due to changes in parking supply

% Change	Impact
15.0%	Negligible
40.0%	Minor
70.0%	Moderate
70.0%	Major



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## MEMORANDUM

**To:** Debra Perkins-Smith  
Colleen Kirby Roberts  
Suzanne Savage  
Stacy Tschuor

**From:** Bonnie Nelson  
Kevin Dwarka

**Date:** June 21, 2005

**Subject:** Revised Auto-Reduction Analysis for MH\FB TIMP EIS

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This memorandum updates the previous version of Nelson\Nygaard's Auto-Reduction Analysis from October, 2004. Auto-reduction factors are provided for accessing the Marin Headlands and Fort Baker as well as for circulation within the park boundaries. This new version of the memorandum incorporates all of the transportation elements of the revised alternatives that are described in the *Working Draft EIS*. The revised alternatives include the following changes:

- GGT Route #10 will not be rerouted to serve Fort Baker under Alternative 2
- The internal shuttle service will not be provided in Alternative 2.
- The location of the shuttle/transit interface is relocated from Danes Drive to the US101/Alexander Avenue Interchange under Alternatives 2, 3, and 4.
- Class 1 Bike Lanes will be provided on Mendell Road under Alternatives 2 & 3.
- Parking fees will be adopted at main parking areas in Alternatives 3 and 4 but parking fees throughout the park is not an element of any of the alternatives.

The revised alternatives also provide a more complete description of the car-free days program. However, this analysis is strictly concerned with the potential for auto-reduction under typical conditions on a Sunday during the summer, the park's peak visitation period. The transit elements of the new alternatives are summarized in the table below. The proposed transit program, and therefore the potential auto-reduction, could be affected by the outcomes of the Marin County Short Range Transit Plan, a comprehensive transit needs assessment that is currently underway for all of Marin County.

**Figure 1: Transit Elements Of Revised Alternatives**

Transit Element	Alternative 1: No Action	Alternative 2: Basic Multi-modal Access	Alternative 3: Enhanced Multi-modal Access  <b>PREFERRED ALTERNATIVE</b>	Alternative 4: Maximum Multi-modal Access
<b>Transit Service Improvements</b>				
<b>Muni 76</b> [San Francisco – Marin Headlands]	<ul style="list-style-type: none"> <li>Sundays only</li> <li>60 minute headway</li> </ul>	<ul style="list-style-type: none"> <li>Saturdays &amp; Sundays</li> <li>No Weekday Service</li> <li>60 minute headway</li> </ul>	<ul style="list-style-type: none"> <li>Saturdays &amp; Sundays</li> <li>No Weekday Service</li> <li>30 minute headway</li> </ul>	<ul style="list-style-type: none"> <li>Saturdays &amp; Sundays</li> <li>No Weekday Service</li> <li>30 minute headway</li> </ul>
<b>GGT Local Service (#10)</b> [San Francisco – Alexander Avenue – Marin County]	<ul style="list-style-type: none"> <li>60 minute headway</li> <li>Weekdays and Weekends</li> <li>No direct service to Fort Baker</li> </ul>	<ul style="list-style-type: none"> <li>60 minute headway</li> <li>Weekdays and Weekends</li> <li>No direct service to Fort Baker</li> <li>Improvement of Bus Stops along Alexander Avenue</li> <li>Transit Transfer Interface @ Alexander Avenue/US 101 intersection</li> </ul>	<ul style="list-style-type: none"> <li>60 minute headway</li> <li>Weekdays and Weekends</li> <li>Direct service to Fort Baker</li> <li>Improvement of Bus Stops along Alexander Avenue</li> <li>Transit Transfer Interface @ Alexander Avenue/US 101 intersection</li> </ul>	<ul style="list-style-type: none"> <li>60 minute headway</li> <li>Weekdays and Weekends</li> <li>Direct service to Fort Baker</li> <li>Improvement of Bus Stops along Alexander Avenue</li> <li>Transit Transfer Interface @ Alexander Avenue/US 101 intersection</li> </ul>
<b>Internal Shuttle</b> [Marin Headlands - Fort Baker]	None	None	<ul style="list-style-type: none"> <li>13 daily trips</li> <li>Weekdays &amp; weekends</li> <li>60 minute headway</li> </ul>	<ul style="list-style-type: none"> <li>13 daily trips</li> <li>Weekdays &amp; weekends</li> <li>60 minute headway</li> </ul>
<b>Access Shuttle</b> [GGB Toll Plaza – Marin Headlands/Fort Baker – Sausalito – Manzanita Transit Center]	None	None	None	Extension of Internal Shuttle to Collection Points outside the Park <ul style="list-style-type: none"> <li>Sausalito – Manzanita Transit Center: 6 daily roundtrips trips</li> <li>GGB Toll Plaza: 7 daily roundtrips</li> <li>Weekday &amp; Weekends</li> <li>Interlined with internal shuttle</li> </ul>
<b>Fort Baker Conference Shuttle</b> [Sausalito – Fort Baker Conference Center – Airport]	<ul style="list-style-type: none"> <li>Service Plan Undetermined</li> </ul>	<ul style="list-style-type: none"> <li>Service Plan Undetermined</li> </ul>	<ul style="list-style-type: none"> <li>Service Plan Undetermined</li> </ul>	<ul style="list-style-type: none"> <li>Service Plan Undetermined</li> </ul>



## CIRCULATION INSIDE OF MARIN HEADLANDS AND FORT BAKER

Generally, the automobile will be faster, cheaper, and more convenient for the majority of internal park trips. However, as shown in the table below, the provision of a free internal shuttle service in tandem with parking fees in selected areas has the potential for achieving auto-reduction under Alternatives 3 and 4.

**Figure 2: Auto-Reduction Factors for Circulation Inside The Park on a Peak Period Sunday**

Alternative	Auto Reduction inside Marin Headlands	Auto Reduction inside Fort Baker
Alternative 1: No Action	0%	0%
Alternative 2: Basic Multi-modal Access	0%	0%
Alternative 3: Enhanced Multi-modal Access	2.5%	2.5%
Alternative 4: Maximum Multi-modal Access	5.0%	5.0%

Based on our professional judgement and peer review of other shuttle systems in other national park settings and rural areas, we assigned a 2.5% auto-reduction factor for Alternative 3. The frequency of the shuttle service and the location of parking fees in selected areas are expected to be identical for Alternatives 3 and Alternative 4. It is our understanding that the Park Service is continuing to develop the parking fee structure. Under the assumption that the parking fees under Alternative 4 will be higher than Alternative 3, we have assigned it a higher auto reduction factor of 5.0%.

## ACCESSING MARIN HEADLANDS AND FORT BAKER

Given the modest changes in the overall levels of transit service under the action alternatives, we do not expect significant opportunities for auto-reduction. The results are summarized in the table below.

**Figure 3: Auto-Reduction Factors for Accessing Park on a Peak Period Sunday**

Alternative	Auto Reduction for Accessing Marin Headlands	Auto Reduction for Accessing Fort Baker
Alternative 1: No Action	0%	0%
Alternative 2: Basic Multi-modal Access	0%	0%
Alternative 3: Enhanced Multi-modal Access	.44%	.71%
Alternative 4: Maximum Multi-modal Access	.88%	1.42%

Pedestrian and bikeway improvements will surely attract new visitors to the park, but these types of improvements are unlikely to change the levels of automobile access to the Park. Consequently, our analysis is restricted to the expected impact of the transit elements as outlined in Figure 1. It is important to note that a formal demand model analysis was beyond the scope of our analysis. We did not predict the actual ridership on each proposed transit service nor did we prepare an overall mode choice estimate. We measured only the expected impact of the alternatives in auto-reduction in terms of *the percentage of current vehicle trips that could reasonably be expected to shift to transit*. Three key factors were considered in our analysis:

- **Travel Time:** the complete time it takes to access the park from trip origin to the park including waiting times for transit service.
- **Travel Cost:** the immediate user costs associated with transportation to the park. This includes transit fares and parking fees.
- **Transfer:** the directness of the transportation service to the desired destination (i.e. the ability to access a park location without needing to transfer).

As shown in the subsequent tables, transit services result in auto-reduction only when they serve large transit markets (San Francisco and Marin County), offer direct service without entailing a transfer to another transit service, and occur in tandem with parking fees.

**Figure 4: Auto-Reduction For Trips To Fort Baker On A Peak Period Sunday**

Alternative 1: No Action						
Alternative Access Option to Fort Baker	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
Muni 76	-	-	-	-	0%	No Muni service to FB
GGT #10	-	-	-	-	0%	No direct service to FB
Internal Shuttle	-	-	-	-	0%	Not operational
Access Shuttle	-	-	-	-	0%	Not operational
FB Conference Center Shuttle	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 2: Basic Multi-modal Access						
Alternative Access Option to Fort Baker	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
Muni 76	-	-	-	-	0%	No Muni service to FB
GGT #10	-	-	-	-	0%	No direct service to FB
Internal Shuttle	-	-	-	-	0%	Not operational
Access Shuttle	-	-	-	-	0%	Not operational
FB Conference Center Shuttle	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 3: Enhanced Multi-modal Access						
Alternative Access Option to Fort Baker	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	15 minute waiting + transfer to internal shuttle + longer travel time	Transit Fares lower than parking fees for 50% of park locations	Yes	0%	Muni 76 does not provide a direct connection to Fort Baker. Relative to driving, the longer travel times and the inconvenience of the transfer suggests that auto-reduction will not be achieved – even with the parking fees.
<b>GGT #10</b>	San Francisco and Marin County	30 minute waiting time + longer travel time	Transit fares lower than parking fees for 50% of park trips	No	.71%	<p>The large size of the transit markets, the wide coverage of the #10, and the parking fees may result in auto-reduction. Based on traffic counts collected on a Sunday during the summer of 2000, there are a total of 1,646 vehicles entering Fort Baker. (See Nelson\Nygaard's <i>Data Collection Analysis, December 2001</i>).</p> <p>Visitor survey data indicates that 57% of park visitors are from either San Francisco or Marin County. This correlates with approximately 938 of the 1,646 vehicles entering Fort Baker.</p> <p>Under Alternative 3, parking fees will be applied to major parking locations, affecting about 50% of park trips. Assuming that 50% (or 469) of the 938 vehicular trips would encounter parking fees and based upon a 2.5% mode shift to GGT#10, there is a potential auto-reduction of 11 vehicles. This accounts for approximately .71% of the 1,646 automobiles entering Fort Baker.</p> <p>Note that the parking fee auto-reduction factor (2.5%) is lower than the parking fee auto-reduction factor (5.0%) used in Alternative 4 where higher parking prices are expected.</p>
<b>Internal Shuttle</b>	Sausalito	30 minute waiting time + comparable travel time	Free	No	0%	Auto-reduction is insignificant as a result of waiting time and the small size of the transit market relative to total visitor population.
<b>Access Shuttle</b>	-	-	-	-	0%	Not operational
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 4: Maximum Multi-modal Access						
Alternative Access Option to Fort Baker	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	15 minute waiting + transfer to internal shuttle + longer travel time	Transit fares lower than parking fees for 50% of park trips	Yes	0%	Muni 76 does not provide a direct connection to Fort Baker. Relative to driving, the longer travel times and the inconvenience of the transfer suggests that auto-reduction will not be achieved – even with the parking fees.
<b>GGT #10</b>	San Francisco and Marin County	30 minute waiting time + longer travel time	Transit fares lower than parking fees for 50% of park trips	No	1.42%	<p>The large size of the transit markets, the wide coverage of the #10, and the parking fees may result in auto-reduction. Based on traffic counts collected on a Sunday during the summer of 2000, there are a total of 1,646 vehicles entering Fort Baker. (See Nelson/Nygaard's <i>Data Collection Analysis, December 2001</i>).</p> <p>Visitor survey data indicates that 57% of park visitors are from either San Francisco or Marin County. This correlates with approximately 938 of the 1,646 vehicles entering Fort Baker.</p> <p>Under Alternative 4, parking fees will be applied to major parking areas, affecting about 50% of park trips. Assuming that 50% (or 469) of the 938 vehicular trips would encounter parking fees and based upon a 5% mode shift to GGT#10, there is a potential auto-reduction of 23 vehicles. This accounts for approximately 1.42% of the 1,646 automobiles entering Fort Baker.</p> <p>Note that the parking fee auto-reduction factor (5.0%) is higher than the parking fee auto-reduction factor (2.5%) used in Alternative 3 where lower parking prices are expected.</p>
<b>Internal Shuttle</b>	Sausalito	30 minute waiting time + comparable travel time	Free	No	0%	Even with parking fees, auto-reduction is insignificant as a result of waiting time and the small size of the transit market relative to total visitor population.
<b>Access Shuttle</b>	San Francisco and Marin County	Access Time + 30 minute waiting time + longer travel time	Free	No	0%	Like Muni 76, regional park and ride shuttles enable access for the transit dependent but do not provide a faster or more convenient alternative than driving to the park
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

**Figure 5: Auto-Reduction Analysis For Trips To Marin Headlands On A Peak Sunday**

Alternative 1: No Action						
Alternative Access Option to Marin Headlands	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	30 minute waiting time + longer travel time	Transit fare	No	0%	Travel time and cost on Muni is not competitive with driving
<b>GGT #10</b>	-	-	-	-	0%	No direct service to Marin Headlands
<b>Internal Shuttle</b>	-	-	-	-	0%	Not operational
<b>Access Shuttle</b>	-	-	-	-	0%	Not operational
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 2: Basic Multi-modal Access						
Alternative Access Option to Marin Headlands	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	30 minute waiting time + longer travel time	Transit fare	No	0%	Travel time and cost on Muni is not competitive with driving
<b>GGT #10</b>	-	-	-	-	0%	No direct service to Marin Headlands
<b>Internal Shuttle</b>	-	-	-	-	0%	Not operational
<b>Access Shuttle</b>	-	-	-	-	0%	Not operational
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 3: Enhanced Multi-modal Access						
Alternative Access Option to Marin Headlands	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	15 minute waiting time + longer travel time	Transit fares are lower than parking fees for 50% of park trips	No	.44%	<p>The large size of the San Francisco transit market, the wide coverage of the #76, and parking fees in main locations of the park may result in auto-reduction. Based on traffic counts collected on a Sunday during the summer of 2000, there are a total of 5,358 vehicles entering the Marin Headlands. (See <i>Nelson/Nygaard's Data Collection Analysis, December 2001</i>)</p> <p>Visitor survey indicates that 35% of park trips are from San Francisco. This correlates with approximately 1,875 vehicles of the total 5,358 vehicles entering the Marin Headlands.</p> <p>Under Alternative 3, parking fees will be applied to major parking areas, affecting about 50% (or 937) of the 1,875 park trips from San Francisco. Based on a 2.5% mode shift factor, there is a potential auto-reduction of 23 vehicles. This accounts for approximately .44% of the total number of vehicles entering the Marin Headlands.</p> <p>Note that the parking fee auto-reduction factor (2.5%) is lower than the parking fee auto-reduction factor (5.0%) used in Alternative 4 where higher parking prices are expected.</p>
<b>GGT #10</b>	San Francisco and Marin County	30 minute waiting time + transfer to internal shuttle + longer travel time	Transit fares are lower than parking fees for 50% of park trips	Yes	0%	Transit dependent populations may use GGT and transfer to the internal shuttle to reach the Headlands. However, even with parking fees, the total travel times will be too long to expect auto-reduction.
<b>Internal Shuttle</b>	Sausalito	30 minute waiting time + longer travel time	Free	Yes	0%	Even with parking fees, auto-reduction is insignificant as a result of waiting time and the small size of the transit market relative to total visitor population.
<b>Access Shuttle</b>	-	-	-	-	0%	Not operational
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

Alternative 4: Maximum Multi-modal Access						
Alternative Access Option to Marin Headlands	Potential Transit market	Comparison of Alternative Access Option to Driving			Estimated Auto-Reduction	Notes
		Travel Time	Travel Cost	Transfer		
<b>Muni 76</b>	San Francisco	15 minute waiting time + longer travel time	Transit fares are lower than parking fees for 50% of park trips	No	.88	<p>The large size of the San Francisco transit market, the wide coverage of the #76, and parking fees in main locations of the park may result in auto-reduction. Based on traffic counts collected on a Sunday during the summer of 2000, there are a total of 5,358 vehicles entering the Marin Headlands. (See <i>Nelson\Nygaard's Data Collection Analysis, December 2001</i>)</p> <p>Visitor survey indicates that 35% of park trips are from San Francisco. This correlates with approximately 1,875 vehicles of the total 5,358 vehicles entering the Marin Headlands.</p> <p>Under Alternative 3, parking fees will be applied to major parking areas, affecting about 50% (or 937) of the 1,875 park trips from San Francisco. Based on a 5% mode shift factor, there is a potential auto-reduction of 46 vehicles. This accounts for approximately .88% of the total number of vehicles entering the Marin Headlands.</p> <p>Note that the parking fee auto-reduction factor (5.0%) is higher than the parking fee auto-reduction factor (2.5%) used in Alternative 3 where lower parking prices are expected.</p>
<b>GGT #10</b>	San Francisco and Marin County	30 minute waiting time + transfer to internal shuttle + longer travel time	Transit fares are lower than parking fees for 50% of park trips	Yes	0%	Transit dependent populations may take advantage of the GGT and internal shuttle connection to the Headlands. However, even with parking fees, the travel times will be too long to expect mode shift.
<b>Internal Shuttle</b>	Sausalito	30 minute waiting time + longer travel time	Free	Yes	0%	Even with parking fees, auto-reduction is insignificant as a result of waiting time and the small size of the transit market relative to total visitor population.
<b>Access Shuttle</b>	San Francisco and Marin County	Access Time + 30 minute waiting time + longer travel time	Free	No	0%	Like Muni 76, regional park and ride shuttles enable access for the transit dependent but do not provide a faster or more convenient alternative than driving to the park
<b>FB Conference Center Shuttle</b>	Conference Center Guests	-	-	-	0%	Service plan undetermined but will not be designed to serve all park visitors.

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04-Feb-09

## Parking Analysis

Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:		General Information		Alternative 1 No Action/Existing Conditions	Alternative 2 Basic Access	Alternative 3 Enhanced Access	Alternative 4 Maximum Access
		Description	Designation	Est. Spaces / Surface	Spaces / Surface	Spaces / Surface	Spaces / Surface
⇩	Trailhead Lot at Conzelman and HW 101	Lot	Marked	52 Paved	50 No change	50 Paved	50 Paved
	Connector road from Trailhead Lot to Conzelman Rd.	Shoulders	Unmarked	20 Gravel	20 Gravel	0 Paved sidewalk	0 Paved sidewalk
	Conzelman Rd. - Alexander Ave. to Battery Spencer	Outboard shoulder	Unmarked	16 Paved	0	0	0
	Battery Spencer	Outboard shoulder	Unmarked	24 Gravel	10 Unpaved Lot	21 Paved Lot	19 Paved Lot
⇩	Overlook One	Outboard shoulder	Unmarked	8 Gravel	7 Unpaved Lot	6 Paved Lot	10 Paved Lot
	Conzelman Rd. - Overlook One to Overlook Two	Outboard shoulder	Unmarked	35 Gravel	0	0	0
	Conzelman Rd. - Overlook One to Overlook Two	Inboard shoulder	Unmarked	6 Paved	4 Paved (Revegetate remainder)	0	4 Paved (Revegetate remainder)
	Overlook Two	Outboard shoulder	Unmarked	15 Gravel	11 Unpaved Lot	11 Paved Lot	13 Paved Lot
⇩	Conzelman Rd. - Overlook Two to McCullough Rd.	Outboard shoulder	Unmarked	10 Paved	10 No change	9 No change	9 No change
	<b>Sub Total:</b>			<b>186</b>	<b>112</b>	<b>97</b>	<b>105</b>
	Trailhead Lot to McCullough Rd.						
	Conzelman Rd. - McCullough Rd. to Hawk Hill	Outboard shoulder	Unmarked	37 Gravel	10 Unpaved (Revegetate remainder)	15 Paved (Revegetate remainder)	0 Revegetate
⇩	Hawk Hill	Outboard/Inboard shoulder	Unmarked	55 Gravel	23 Unpaved Lot	55 Paved Lot	50 Paved Lot
	<b>Sub Total:</b>			<b>92</b>	<b>33</b>	<b>70</b>	<b>50</b>
	McCullough Rd. to Hawk Hill						
	Conzelman Rd. - Hawk Hill to Upper Fishermans Trailhead	Inboard shoulder	Unmarked	6 Gravel	0 Revegetate	0 Revegetate	0 Revegetate
⇩	Upper Fishermans Trailhead Lot	Lot	Unmarked	13 Gravel	11 Gravel Lot	11 Paved Lot	19 Paved Lot
	Conzelman Rd. at Upper Fishermans Trailhead	Inboard shoulder	Unmarked	33 Grass	33 No change	33 No change	33 No change
	Conzelman Rd. - Upper Fishermans Trailhead to Field Rd.	North shoulder	Unmarked	27 Gravel	27 No change	27 No change	27 No change
	Lower Fishermans Trailhead Lot	Lot	Unmarked	28 Gravel	8 Gravel Lot	8 Gravel Lot	8 Gravel Lot
	<b>Sub Total:</b>			<b>107</b>	<b>79</b>	<b>79</b>	<b>87</b>
	Hawk Hill to Jct. With Field Road						

## Golden Gate National Recreation Area

**Legend:** Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

[illegible]

## Parking Analysis

### Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:		General Information		Alternative 1 No Action/Existing Conditions		Alternative 2 Basic Access		Alternative 3 Enhanced Access		Alternative 4 Maximum Access	
		Description	Designation	Est. Spaces	Surface	Spaces	Surface	Spaces	Surface	Spaces	Surface
	Battery Mendell	Head-in	Unmarked	10	Gravel	10	No change	0	Closed to vehicles	10	No change
	Roadside shoulder parking	Shoulder	Unmarked	20	Gravel	20	No change	0	Revegetate	0	Revegetate
	Bird Island Overlook	Lot	Unmarked	30	Gravel	0	Closed to vehicles	0	Closed to vehicles	9	Paved
	Sub Total: Mendell Road			60		30		0		19	
	Headlands Center for the Arts	Lot	Marked	12	Gravel	12	No change	12	Paved	12	Paved
	Along Simmonds and Rosenstock Rds.	Head-in and Lot	Some marked	55	Mixed Gravel & Paved	55	No change	55	No change	55	No change
	Sub Total: Simmonds and Rosenstock Rds.			67		67		67		67	
	Mitchell Rd. - Bunker Rd. to Rodeo Beach Lot	Head-in	Unmarked	150	Gravel	150	No change	62	Gravel	40	Gravel
	Fort Cronkhite (and/or Maintenance Yard)	Varies	Varies	116	Varies	116	No change	186	Varies	186	Varies
	Rodeo Beach Paved Lot	Lot	Striped	94	Paved	94	No change	94	No change	94	No change
	Rodeo Beach Gravel Lot	Lot	Marked	80	Gravel	55	Gravel	0	Revegetate	0	Revegetate
	Sub Total: Fort Cronkhite Area (including Mitchell Road)			440		415		342		320	
	Home Away From Homelessness	Lot	Unmarked	3	Gravel	3	No change	3	No change	3	No change
	Maintenance Yard - Government vehicle lot only	Lot	Unmarked	12	Gravel	13	Paved	13	Paved	13	Paved
	R&T Employee Lot	Lot	Unmarked	13	Paved	13	Paved	13	Paved	13	Paved
	Visitor Lot	Lot	Unmarked	10	Gravel	22	bus spaces and remainder to be used for Maint. Yard	22	bus spaces and remainder to be used for Maint. Yard	22	bus spaces and remainder to be used for Maint. Yard
	Old Bunker Rd. - Maintenance Yard to Marine Mammal Center	Parallel	Unmarked	19	Paved	19	Paved and striped	19	Paved and striped	19	Paved and striped
	Marine Mammal Center	Lot	Striped	43	Paved (per MMC site Improvements EA/FONSI)	43	No change	43	No change	43	No change
	Sub Total: Old Bunker Rd. & Marine Mammal Center			100		93		93		93	
				1593		1338		1330		1408	

## Golden Gate National Recreation Area

**Golden Gate National Recreation Area**  
 Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
 White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:		General Information		Alternative 1 No Action/Existing Conditions		Alternative 2 Basic Access		Alternative 3 Enhanced Access		Alternative 4 Maximum Access	
	Description	Designation	Est. Spaces	Surface	Spaces	Surface	Spaces	Surface	Spaces	Surface	Spaces
	Lot at Danes Dr. Intersection	Striped	8	Paved		No change		No change			8
	Roadside Parking along East Bunker Rd.										
	<b>Sub Total:</b>		<b>8</b>				<b>8</b>		<b>8</b>		<b>8</b>
	<b>East Bunker Road</b>										
	East Rd. - Alexander Ave. to Murray Circle	Unmarked	58	Gravel		No change		Paved			41
	<b>Sub Total:</b>		<b>58</b>				<b>58</b>		<b>41</b>		<b>41</b>
	<b>East Road</b>										
					445		445				445
			150			150		150			150
			30			30		30			30
			240			240		240			240
			20			20		20			20
			10			10		10			10
			<b>961</b>		<b>961</b>		<b>961</b>		<b>944</b>		<b>944</b>
			<b>2554</b>			<b>2299</b>		<b>2274</b>			<b>2352</b>

📄 Parking utilization information available from Existing Conditions Report, November 15, 2000.

\* These locations are not part of the MH-FB TMP, but are listed here as a convenience to allow a complete summary of parking located in the greater MH-FB area. The figures listed here are taken from the Fort Baker Plan, and if that plan did not include a specific number of parking spaces for an area, they are estimates by NPS staff.

<sup>^</sup> This location is restricted due to Homeland Security issues with the Golden Gate Bridge. Right now it is not open to visitors.

~ The total in Fort Baker could be up 50 spaces higher due to the undetermined quantity of parking available at Saterlee Road (cover - waterfront area).

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## Car Free Day Parking Analysis - Alternatives 3 & 4 Only

Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:	General Information		Alternative 1 No		Alternative 3		Alternative 4	
			Est.	Surface	Spaces	Surface	Spaces	Maximum Access Surface
<b>CONZELMAN ROAD</b>								
Trailhead Lot at Conzelman and HW 101	Lot	Marked		52 Paved		50 Paved		50 Paved
Connector road from Trailhead Lot to Conzelman Rd.	Shoulders	Unmarked		20 Gravel		0 Paved sidewalk		0 Paved sidewalk
Conzelman Rd. - Alexander Ave. to Battery Spencer	Outboard shoulder	Unmarked		16 Paved		0		0
Battery Spencer	Outboard shoulder	Unmarked		24 Gravel		21 Paved Lot		19 Paved Lot
Overlook One	Outboard shoulder	Unmarked		8 Gravel		6 Paved Lot		10 Paved Lot
Conzelman Rd. - Overlook One to Overlook Two	Outboard shoulder	Unmarked		35 Gravel		0		0
Conzelman Rd. - Overlook One to Overlook Two	Inboard shoulder	Unmarked		6 Paved		4 Paved (Revegetate remainder)		4 Paved (Revegetate remainder)
Overlook Two	Outboard shoulder	Unmarked		15 Gravel		11 Paved Lot		13 Paved Lot
Conzelman Rd. - Overlook Two to McCullough Rd.	Outboard shoulder	Unmarked		10 Paved		9 No change		9 No change
<b>Sub Total:</b>				<b>186</b>		<b>101</b>		<b>105</b>
<b>Trailhead Lot to McCullough Rd.</b>								
Conzelman Rd. - McCullough Rd. to Hawk Hill	Outboard shoulder	Unmarked		37 Gravel		Closed to traffic		Closed to traffic
Hawk Hill	Outboard/inboard shoulder	Unmarked		55 Gravel		Closed to traffic		Closed to traffic
<b>Sub Total:</b>				<b>92</b>		Closed to traffic		Closed to traffic
<b>McCullough Rd. to Hawk Hill</b>								
Conzelman Rd. - Hawk Hill to Upper Fishermans Trailhead	Inboard shoulder	Unmarked		6 Gravel		Closed to traffic		Closed to traffic
Upper Fishermans Trailhead Lot	Lot	Unmarked		13 Gravel		Closed to traffic		Closed to traffic
Conzelman Rd. at Upper Fishermans Trailhead	Inboard shoulder	Unmarked		33 Grass		Closed to traffic		Closed to traffic
Conzelman Rd. - Upper Fishermans Trailhead to Field Rd.	North shoulder	Unmarked		27 Gravel		Closed to traffic		Closed to traffic
Lower Fishermans Trailhead Lot	Lot	Unmarked		28 Gravel		Closed to traffic		Closed to traffic
<b>Sub Total:</b>				<b>107</b>		Closed to traffic		Closed to traffic
<b>Hawk Hill to Jct. With Field Road</b>								

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### Car Free Day Parking Analysis - Alternatives 3 & 4 Only

Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:		General Information		Alternative 1 No Action/Existing Conditions		Alternative 3 Enhanced Access		Alternative 4 Maximum Access	
	Description	Designation	Est. Spaces	Surface	Spaces	Surface	Spaces	Surface	Spaces
<b>McCULLOUGH ROAD</b>									
	Near foot of Slacker Hill Road	Outboard Shoulder		6 Gravel		6 No Change		6 No Change	
	On Julian at Coastal Trail gate	Unmarked		5 Gravel		9 Paved Lot		0 Revegetate	
	New parking area off McCullough at Conzelman Intersection	Marked		0		0 No Change		10 Paved Lot	
<b>Sub Total:</b>									
<b>McCullough Road</b>			11			15		16	
<b>BUNKER ROAD</b>									
	Warehouse	Unmarked		28 Gravel		Closed to traffic		Closed to traffic	
	Lagoon picnic area	Unmarked		6 Gravel		Closed to traffic		Closed to traffic	
	North shoulder at Miwok/Bobcat trailhead	Unmarked		15 Gravel		Closed to traffic		Closed to traffic	
	Riding Stables Lot	Unmarked		12 Gravel		12 Gravel		12 Paved	
	Rifle Range Lot (north side of Bunker Rd.)	Unmarked		20 Grass/Gravel		0 Revegetate		0 Revegetate	
	Smith Road (across from stables)	Unmarked		35 Paved		150 Reinforced Grass		200 Reinforced Grass	
	NE side of Rifle Range/South side of Bunker Road (grass overflow/special event parking)	Unmarked (requires parking staff to reach capacity)		100 Grass		0 Revegetate		100 Grass	
	Bunker Road Bypass	Unmarked		0 Gravel		60 Park on closed road		0 Revegetate closed road	
	Capehart Housing	Unmarked		128 Paved		128 No change		128 No change	
<b>Sub Total:</b>			344			350		440	
<b>Bunker Rd. - Capehart to Field Road</b>									
<b>FIELD ROAD</b>									
	Field Rd. - Bunker Rd. to Mendell Rd.	Shoulder		12 Gravel		Closed to traffic		Closed to traffic	
	Visitors Center Lot	Striped		27 Paved		Closed to traffic		Closed to traffic	
	Nike Missile Site (Usually closed)	Unmarked		25 Paved		Closed to traffic		Closed to traffic	
	Three Sisters	Unmarked		9 Gravel		Closed to traffic		Closed to traffic	
	Battery Alexander Lot	Marked		60 Gravel		Closed to traffic		Closed to traffic	
	YMCA	Striped		44 Paved		Closed to traffic		Closed to traffic	
	Point Bonita Trailhead	Unmarked		9 Gravel		Closed to traffic		Closed to traffic	
<b>Sub Total:</b>			186			0		0	
<b>Field Road</b>									

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## Car Free Day Parking Analysis - Alternatives 3 & 4 Only

Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas  
White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:		General Information		Alternative 1 No Action/Existing Conditions		Alternative 3 Enhanced Access		Alternative 4 Maximum Access	
	Description	Designation	Est. Spaces	Surface	Spaces	Surface	Spaces	Surface	Spaces
<b>MENDELL ROAD</b>									
	Head-in	Unmarked		10 Gravel		Closed to traffic		Closed to traffic	
	Shoulder	Unmarked		20 Gravel		Closed to traffic		Closed to traffic	
	Lot	Unmarked		30 Gravel		Closed to traffic		Closed to traffic	
<b>Sub Total:</b>				<b>60</b>			<b>0</b>		<b>0</b>
<b>Mendell Road</b>									
<b>FORT BARRY</b>									
	Lot	Marked		12 Gravel		Closed to traffic		Closed to traffic	
	Head-in and Lot	Some marked		55 Mixed Gravel & Paved		Closed to traffic		Closed to traffic	
<b>Sub Total:</b>				<b>67</b>			<b>0</b>		<b>0</b>
<b>Simmonds and Rosenstock Rds.</b>									
<b>MITCHELL ROAD</b>									
	Head-in	Unmarked		150 Gravel		Closed to traffic		Closed to traffic	
	Varies	Varies		116 Varies		Closed to traffic		Closed to traffic	
	Lot	Striped		94 Paved		Closed to traffic		Closed to traffic	
	Lot	Marked		80 Gravel		Closed to traffic		Closed to traffic	
<b>Sub Total:</b>				<b>440</b>			<b>0</b>		<b>0</b>
<b>Fort Cronkhite Area (including Mitchell Road)</b>									
<b>OLD BUNKER ROAD</b>									
	Lot	Unmarked		3 Gravel		Closed to traffic		Closed to traffic	
	Lot	Unmarked		12 Gravel		Closed to traffic		Closed to traffic	
	Lot	Unmarked		13 Paved		Closed to traffic		Closed to traffic	
	Lot	Unmarked		10 Gravel		22 bus spaces and remainder to be used for Maint. Yard		22 bus spaces and remainder to be used for Maint. Yard	
	Parallel	Striped		19 Paved		0 Avail. For MMC volunteers & staff only		0 Avail. For MMC volunteers & staff only	
	Lot	Striped		43 Paved (per MMC site Improvements EA/FONSI)		0 Avail. For MMC volunteers & staff only		0 Avail. For MMC volunteers & staff only	
<b>Sub Total:</b>				<b>100</b>			<b>2</b>		<b>2</b>
<b>Old Bunker Rd. &amp; Marine Mammal Center</b>									
<b>SUB TOTAL MARIN HEADLANDS</b>				<b>1593</b>			<b>468</b>		<b>563</b>



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### Car Free Day Parking Analysis - Alternatives 3 & 4 Only

Golden Gate National Recreation Area

Legend: Gray shaded areas = existing or proposed lot or improved parking areas

White shaded areas = existing or proposed roadside shoulder parking areas

Parking Area Location:	General Information		Alternative 1 No		Alternative 3		Alternative 4	
			Est.	Surface	Spaces	Surface	Spaces	Maximum Access
	Description	Designation						Surface
<b>EAST BUNKER ROAD</b>								
Lot at Danes Dr. Intersection	Lot	Striped		8 Paved		8 No change		8 No change
<b>Sub Total:</b>				<b>8</b>		<b>8</b>		<b>8</b>
<b>East Bunker Road</b>								
<b>EAST ROAD</b>								
East Rd. - Alexander Ave. to Murray Circle	Head-in	Unmarked		58 Gravel		82 head in parking in parallel pullouts only		82 head in parking in parallel pullouts only
Northbound lane of East Road used for parallel parking, traffic & parking to be directed by NPS staff						108 parallel parking in remaining 1080m of closed travel lane		108 parallel parking in remaining 1080m of closed travel lane
<b>Sub Total:</b>				<b>58</b>		<b>190</b>		<b>190</b>
<b>East Road</b>								
<b>FORT BAKER RCC AREA *</b>				445		445		445
<b>SATERLEE ROAD (COVE AREA NEAR WATERFRONT) *</b>				150		0		0
<b>COAST GUARD STATION (CENTER ST) *</b>				30		0		0
<b>EAST RD (GENERAL &amp; BADM PARKING) *</b>				240		240		240
<b>LIME POINT * ^</b>				20		0		0
<b>FISHING PIER *</b>				10		0		0
<b>SUB-TOTAL FORT BAKER ~ ~</b>				<b>961</b>		<b>883</b>		<b>883</b>
<b>SUM TOTAL</b>				<b>2554</b>		<b>1351</b>		<b>1446</b>

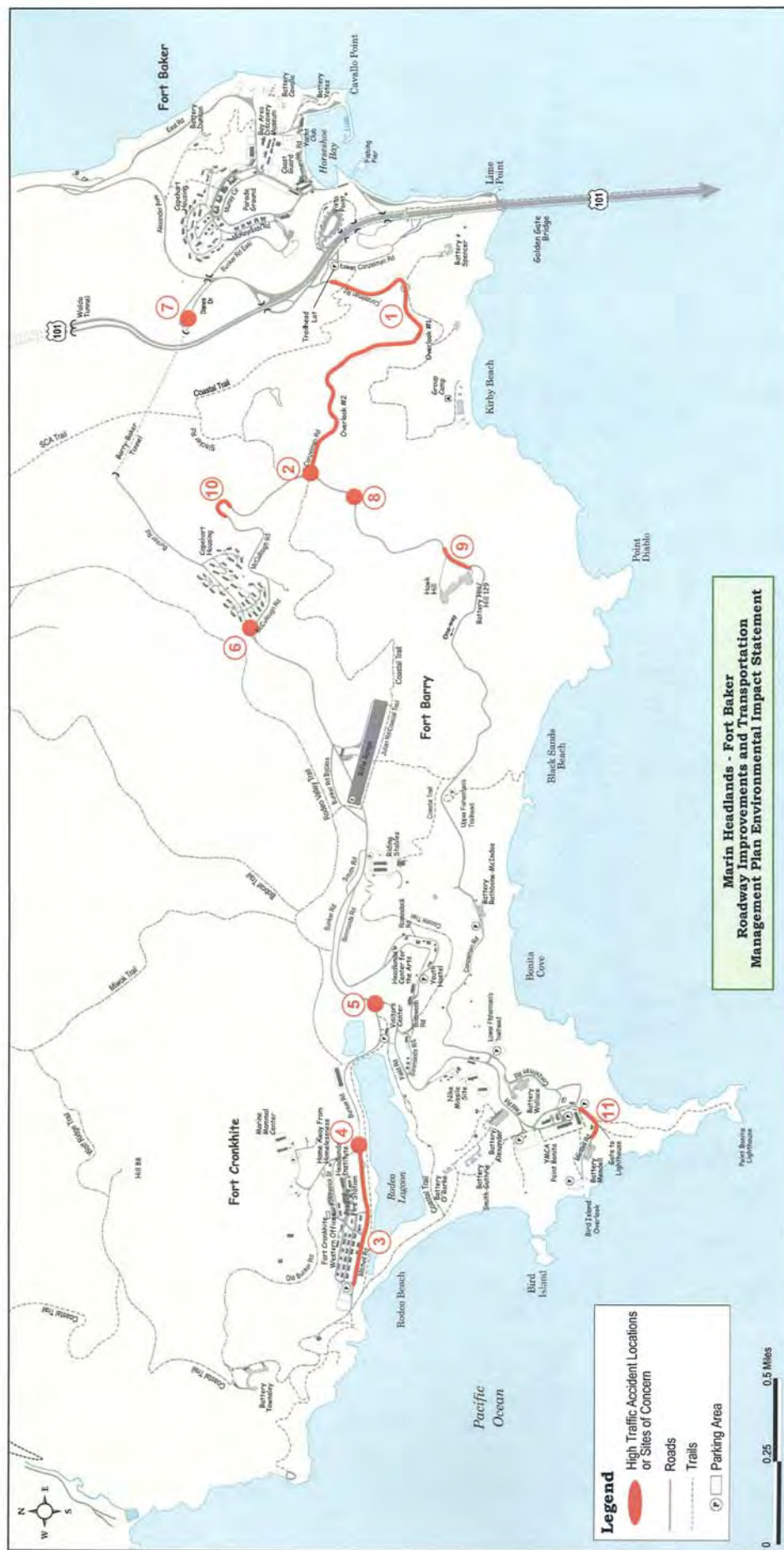


# High Motor Vehicle Traffic Accident Locations & Safety Improvement Prescriptions

## Marin Headlands Transportation Infrastructure & Management Plan EIS

Revised October 2004

Map Site No.	Site Name	Current Situation Description	Severity	Alternative 2 - Basic Access Treatment	Alternative 3 - Enhanced Access Treatment	Alternative 4 - Maximum Access Treatment
<b>Documented High Accident Locations</b>						
	Conzelman Rd. US101 to McCullough Rd. (includes Battery Spencer, Overlooks 1 & 12)	High traffic volumes. Overlook parking areas on blind corners, with high parking demand causing illegal shoulder parking that intrudes into travel lanes. Cars blindly pulling in & out of traffic, high speed downhill bicycle traffic	Severe, 5.75 Acc/MVMT (double average for 2-lane roads)	Delineate & reduce overlook parking, block partial pullouts by moving guardrail closer to lane edge, allowing parallel parking only in two areas with adequate sight distance. Prescriptions will have limited effectiveness & may worsen situation	Excavate cut slopes at 3 blind overlook corners to improve sight distance, pave parking to delineate legal stalls, install barrier in centerline at Battery Spencer to reduce left turns in areas lack proper sight distance, provide backing space in overlook parking areas, block partial pullouts by moving guardrail closer to lane edge, allowing parallel parking only in two areas with adequate sight distance.	Further excavate cut slopes at 3 blind overlook corners to improve sight distance & provide median between travel lanes & parking areas, pave parking to delineate legal stalls, provide backing space in overlook parking areas, block partial pullouts by moving guardrail closer to lane edge, allowing parallel parking only in two areas with adequate sight distance.
	Conzelman-McCullough Intersection	Y-shaped 3 way intersection partially modified to 'Tee' in 1998, buses trying to turn around islands	Moderate, 1-leg of intersection with inadequate sight distance remains,	Convert fully to Tee alignment, convert McCullough road to one-way northbound, does not provide turnaround space	Convert to roundabout, provides safe turnaround space	Convert to roundabout, provides safe turnaround space
	Mitchell Rd. (Bunker intersection to Rodeo Beach)	Heavily used, head in parking on road shoulder, cars backing out blindly into travel lanes	Moderate	None	Provide backing space for head in parking stalls before entering travel lanes, where there is inadequate space to provide, convert to parallel stalls	Provide backing space for head in parking stalls before entering travel lanes, where there is inadequate space to provide, convert to parallel stalls
	Bunker- Old Bunker-Mitchell Road intersection	V shaped intersection on crest of hill with very limited sight distance, westbound traffic note required to stop	Severe	Immediately install stop sign for westbound traffic, monitor traffic accident rates for 3 years minimum, realign to "Tee" intersection, shift crest of hill westward	Immediately install stop sign for westbound traffic, monitor traffic accident rates for 3 years minimum, realign to "Tee" intersection, shift crest of hill westward	Immediately install stop sign for westbound traffic, monitor traffic accident rates for 3 years minimum, realign to "Tee" intersection, shift crest of hill westward
	Bunker- Field intersection	Y-shaped intersection with very limited sight distance for left turn movements	Severe	Realign to 'Tee' alignment	Realign to 'Tee' alignment	Realign to 'Tee' alignment
	Bunker- McCullough intersection	Y-shaped intersection with very limited sight distance for turn movements	Severe	Realign to 'Tee' alignment	Realign to 'Tee' alignment	Realign to 'Tee' alignment
	East Portal of Baker-Barry tunnel	Eastbound cars exiting tunnel have hit westbound cars waiting to enter, recommended improvements made in 2001		Improvements already completed, reassess to determine if effective, add lighted "turning traffic ahead" warning sign inside tunnel for eastbound traffic	Improvements already completed, reassess to determine if effective, add lighted "turning traffic ahead" warning sign inside tunnel for eastbound traffic	Improvements already completed, reassess to determine if effective, add lighted "turning traffic ahead" warning sign inside tunnel for eastbound traffic
<b>Other Sites of Concern (but sites without high documented accident histories)</b>						
	Conzelman Rd. Pullout (under eucalyptus trees west of McCullough)	Pullout on blind curve with high speed bike traffic	Moderate	Close pullout with guardrail	Close pullout with guardrail	Close pullout with guardrail
	Hawk Hill parking	Inadequate space for head in parking, cars partially block travel lane	Low	Convert parking to parallel	Convert parking to parallel	Widen road bench to allow for adequate head in parking space
	McCullough Road switchback corner	Tight radius, narrow blind corner causes buses to cross centerline, fast traffic encounters slow moving uphill bikes with little warning	Moderate	Convert road to one way (for motor vehicles)	Excavate inside corner ridge to improve sight distance, provide curve widening to allow buses to stay in lane	Excavate inside corner ridge to improve sight distance, provide curve widening to allow buses to stay in lane, provide separate class II bike lane
	Pt. Bonita Trailhead on Field & Mendell Roads.	Heavy parking parallel pressure intruding into travel lanes	Low	No Change	Direct visitors to Battery Alexander parking area, provide off street trail connection to trailhead, curb roadway to block parallel parking where space is inadequate	Direct visitors to Battery Alexander parking area, provide off street trail connection to trailhead, curb roadway to block parallel parking where space is inadequate
	Conzelman Rd. 1-way segment @ Station 12.2-650	Narrow 14' wide paved lane with reverse super elevation on curve causes speeding cars to drift off onto gravel shoulder, then over correct and loose control.	Moderate (no accidents listed during 3-year 1996-99 study period, but Rangers report several recent accidents)	Install correct super elevation, increase paved width through curve by approximately 1m, add advance rumble strips and warning signs to slow traffic	Install correct super elevation, increase paved width through curve by approximately 1m, add advance rumble strips and warning signs to slow traffic	Install correct super elevation, increase paved width through curve by approximately 1m, add advance rumble strips and warning signs to slow traffic



### High Traffic Accident Locations or Sites of Concern



### **Biological Resources**

1. Special-Status Plant Species
2. Listed Wildlife and Aquatic Species Considered for Effects  
Analyses Under the Marin Headlands – Fort Baker Transportation  
Management Plan Biological Assessment
3. Proposed Restoration and Compensation Areas for Listed  
Species
4. Mission Blue Butterfly Habitat Enhancement and Targeted  
Thoroughwort Removal (Project 24)
5. Mission Blue Butterfly Habitat Protection – Targeted Thoroughwort  
Control (Project 28a)

## Special-Status Plant Species

Federally Listed Special-Status Plant Species with Potential to Occur in the Marine Headlands /Fort Baker Project Area						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
Sonoma alopecurus <i>Alopecurus aequalis</i> var. <i>sonomensis</i>	E		Freshwater marshes and swamps, riparian scrub; 5-210 m	Marin and Sonoma Counties; known from fewer than five occurrences; nearest known occurrence is approximately 12 miles north of the project site at Pt. Reyes	May-July	Unlikely - this species was not found during focused special-status plant surveys in 2005
Marsh Sandwort <i>Arenaria paludicola</i>	E	E	Freshwater bogs and fens, marshes and swamps; 3 – 170 m	Known from only two occurrences at Inglenook fen (Mendocino County) and Black Lake Canyon (San Luis Obispo County); extirpated from Los Angeles, San Bernardino, Santa Cruz and San Francisco Counties, and Washington State	May - August	Unlikely; this species was not found during focused special-status plant surveys in 2005
Tiburon mariposa lily <i>Calochortus tiburonensis</i>	T	T	Serpentine substrates in valley and foothill grassland; 50-150 m	Known from only one occurrence at Ring Mountain Preserve in Marin County	March-June	None – no suitable serpentine habitat (NPS file information)
Sonoma spineflower <i>Chorizanthe valida</i>	E	E	Sandy substrates in coastal prairie; 10 – 305 m	Known from only one occurrence at Pt. Reyes (Marin County); extirpated from Sonoma County	June - August	Low
Robust spineflower <i>Chorizanthe robusta</i> var. <i>robusta</i>	E		Openings in cismontane woodland, coastal dunes, and coastal scrub; sandy or gravelly substrates; 3-300 m	Only four known occurrences remaining in Monterey and Santa Cruz Counties; extirpated from Alameda, Santa Clara, and San Mateo Counties	April-September	None – no suitable habitat (NPS file information)
Soft bird's beak <i>Cordylanthus mollis</i> ssp. <i>mollis</i>	E	R	Coastal salt marshes and swamps; 0-3 m	Contra Costa, Napa, and Solano Counties; known from fewer than 20 occurrences; believed extirpated from Marin, Sacramento, and Sonoma Counties	July-November	None – no suitable habitat

## Special-Status Plant Species

Federally Listed Special-Status Plant Species with Potential to Occur in the Marine Headlands /Fort Baker Project Area						
Species	Listing Status			Habitat	Distribution	Flowering Period
	Fed.	State	CNPS			
Yellow larkspur <i>Delphinium luteum</i>	E	R	1B	Rocky sites in chaparral, coastal prairie, coastal scrub; 0-100 m	Marin and Sonoma Counties; known from only three occurrences including one at Tomales Bay approximately 23 miles north of the project site	March-May  Unlikely - this species was not found during focused special-status plant surveys in 2005
Marin dwarf flax <i>Hesperolinon congestum</i>	T	T	1B	Serpentine substrates in chaparral and valley and foothill grassland; 5- 370 m	Marin, San Francisco, and San Mateo Counties; known from fewer than twenty occurrences	April – July  None – no suitable habitat
Santa Cruz tarplant <i>Holocarpha macradenia</i>	E	T	1B	Coastal prairie, coastal scrub, valley and foothill grassland; often on clay or sandy substrates; 10-220 m	There are less than 15 extant occurrences in Monterey and Santa Cruz Counties; believed to be extirpated from Alameda, Contra Costa, and Marin Counties	June-October  None – all San Francisco Bay area populations have been extirpated since 1993 [Federal Register: October 16, 2002 (Volume 67, Number 200)]
Beach layia <i>Layia carnosa</i>	E	E	1B	Sandy substrates in coastal dunes and coastal scrub; 0 – 60 m	Humboldt, Monterey and Marin Counties; extirpated from Santa Barbara and San Francisco Counties	March - July  No occurrences present in GGNRA. Seeds of species were reintroduced to Crissy Field in 1998-9, however did not establish (NPS 2004)

## Special-Status Plant Species

Federally Listed Special-Status Plant Species with Potential to Occur in the Marine Headlands /Fort Baker Project Area						
Species	Listing Status			Habitat	Distribution	Flowering Period
	Fed.	State	CNPS			
Tidestrom's lupine <i>Lupinus tidestromii</i>	E	E	1B	Coastal dunes; 0-100 m	Monterey, Marin, and Sonoma Counties; known from less than 20 occurrences	April-June  None – no suitable habitat (NPS file information)
White rayed pentachaeta <i>Pentachaeta bellidiflora</i>	E	E	1B	Valley and foothill grassland (often serpentine); 35 – 620 m	Known from only one occurrence in San Mateo County; extirpated from Marin and Santa Cruz Counties	March - May  Unlikely - this species was not found during focused special-status plant surveys in 2005
Tiburon jewel-flower <i>Streptanthus niger</i>	E	E	1B	Serpentine substrates in valley and foothill grassland; 30-150 m	Marin County; known from only three occurrences on the Tiburon Peninsula	May-June  None – no serpentine habitat in project area
Showy Indian Clover <i>Trifolium amoenum</i>	E		1B	Coastal bluff scrub, valley and foothill grassland (sometimes serpentine); 5-415 m	Marin County; only one known occurrence remaining; historic occurrences in six other counties are believed to be extirpated	April-June  Unlikely - this species was not found during focused special-status plant surveys in 2005

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status			Habitat	Distribution	Flowering Period
	Fed.	State	CNPS			
Pink sand verbena <i>Abronia umbellata</i> ssp. <i>umbellata</i>	SLC			Coastal dunes	Mendocino, Sonoma, Monterey, San Luis Obispo, Santa Barbara, and San Diego Counties	June-October  None – no suitable habitat
Coast rock cress <i>Arabis blepharophylla</i>	SLC		4	Coastal bluff scrub, coastal scrub, coastal prairie, coastal upland forest	Contra Costa, Monterey, Marin, Santa Cruz, San Francisco, San Mateo, and Sonoma Counties	February-May  Known - one occurrence of this species was documented during surveys conducted in 2005
Nuttall's milk vetch <i>Astragalus nuttallii</i> var. <i>virgatus</i>	SLC			Coastal bluff scrub, coastal dunes	Mendocino, Sonoma, Marin, San Francisco, and San Mateo Counties	January-November  Moderate
Coastal marsh milkvetch <i>Astragalus pycnostachyus</i> var. <i>pycnostachyus</i>	SLC		1B	Coastal dunes, coastal salt and streamside marshes and swamps	Known from fewer than ten occurrences in Humboldt, Marin, and San Mateo Counties. Extirpated from Humboldt County.	April-October  None – no suitable habitat
Alkali milk vetch <i>Astragalus tener</i> var. <i>tener</i>	SC*		1B	Alkali playas and alkaline soils in valley and foothill grassland (adobe clay) and vernal pools; 1-60 m	Alameda, Merced, Napa, Solano, and Yolk Counties. Extirpated from Contra Costa, Monterey, San Benito, Santa Clara, San Francisco, San Joaquin, Sonoma, and Stanislaus Counties	March-June  None – no suitable habitat
California saltbush <i>Atriplex californica</i>	SLC			Sandy soils in coastal dunes and coastal scrub, salt marshes	Sonoma, Marin, San Francisco, Alameda, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties	April-November  Moderate

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
Coast Indian paintbrush <i>Castilleja affinis</i> ssp. <i>affinis</i>	SLC		Coastal scrub, chaparral	Known from all coastal counties and from nearly every county in California.	March-May	High
Salt marsh owl's clover <i>Castilleja ambigua</i> ssp. <i>ambigua</i>	SLC		Coastal bluff and coastal prairie; 0-100 m	Del Norte, Humboldt, Mendocino, Sonoma, Napa, Marin, Contra Costa, Alameda, San Mateo, Santa Cruz, Monterey, and San Luis Obispo Counties	July-August	Moderate
Purple owl's clover <i>Castilleja exserta</i> ssp. <i>latifolia</i>	SLC		Coastal bluffs and dunes; 0-200 m	Humboldt, Mendocino, Sonoma, Marin, Contra Costa, San Francisco, Alameda, San Mateo, Santa Cruz, Monterey, Santa Clara, San Luis Obispo, and Santa Barbara Counties	March-May	Moderate
California goosefoot <i>Chenopodium californicum</i>	SLC		Open sites, sandy to clay soils; 0-1500 m	Coastal counties from Sonoma County to San Diego County, outer North Coast Ranges, central and southern Sierra Nevada Foothills, Tehachapi Mountains, and the Great Valley	March-June	Moderate
San Francisco Bay spineflower <i>Chorizanthe cuspidata</i> var. <i>cuspidata</i>	SC	1B	Sandy soils in coastal bluff scrub, coastal dunes, coastal prairie, and coastal scrub; 3 -215 m	Marin, San Francisco, San Mateo Counties; distribution uncertain in Santa Clara and Sonoma Counties; extirpated from Alameda County	April-August	Moderate



## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS			
Franciscan thistle <i>Cirsium andrewsii</i>	SC		1B	Mesic sites in broadleaved upland forest, coastal bluff scrub, coastal prairie, and coastal scrub, sometimes serpentinite soils; 0 – 135 m	Contra Costa, Marin, and San Francisco Counties; extirpated from San Mateo and Sonoma Counties	March-July  Known populations occur in seeps in Rodeo and Gerbode Valleys. and were monitored in 2005
Compact cobweb thistle <i>Cirsium occidentale</i> var. <i>compactum</i>	SC*		1B	Chaparral, coastal dunes, coastal prairie, coastal scrub; 5 – 150 m	Known from fewer than 20 occurrences in Monterey, San Luis Obispo, and San Francisco Counties; distribution in Monterey County is uncertain; extirpated from San Francisco County	April-June  Low - this species is not known from Marin County; believed extirpated from the area
Davy's clarkia <i>Clarkia davyi</i>	SLS			Coastal bluffs and coastal prairie; 0-100 m	Del Norte, Siskiyou, Humboldt, Mendocino, Tehama, Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, San Luis Obispo, and Santa Barbara Counties	June-July  Moderate
Round-headed Chinese houses <i>Collinsia corymbosa</i>	SC*		1B	Coastal dunes; 0 – 20 m	Humboldt, Mendocino, and Sonoma Counties; distribution in Marin County uncertain; extirpated from San Francisco County	April-June  None – no suitable habitat
California croton <i>Croton californicus</i>	SLC			Coastal sage scrub, coastal strand, chaparral, creosote bush scrub	Contra Costa, San Francisco, San Mateo, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern, Orange, San Diego, Imperial, Riverside, San Bernardino, and Inyo Counties	March-October  Moderate

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
Tiburon buckwheat <i>Eriogonum luteolum</i> var. <i>caninum</i>	SLC		3	Serpentine soils in chaparral, coastal prairie, valley and foothill grassland; 10 – 500 m	Alameda, Colusa, Lake, Marin, Napa, Santa Clara, and San Mateo Counties; extirpated from Sonoma County	June-September  None – no suitable habitat
San Francisco wallflower <i>Erysimum franciscanum</i>	SC		4	Chaparral, coastal dunes, coastal scrub, valley and foothill grassland, often serpentine or granitic soils; 0-520 m	Marin, Santa Clara, Santa Cruz, San Francisco, San Mateo, and Sonoma Counties	March-June  Known - two occurrences of this species were documented during surveys conducted in 2005
Fragrant fritillary <i>Fritillaria liliacea</i>	SC		1B	Cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland, often serpentine soils; 3 – 410 m	Alameda, Contra Costa, Monterey, Marin, San Benito, Santa Clara, San Francisco, San Mateo, Solono, and Sonoma Counties	February-April  Moderate
San Francisco gilia <i>Gilia capitata</i> ssp. <i>chamissonis</i>	SC		1B	Coastal dunes, coastal scrub; 2 – 200 m	Marin, San Francisco, and Sonoma Counties	April-July  Moderate
Yarrow-leaf gilia <i>Gilia millefoliata</i>	SLC*		1B	Coastal dunes; 2 – 20 m	Del Norte, Humboldt, Mendocino, Marin, and Sonoma Counties and Oregon State; extirpated from San Francisco County	April-July  None - no suitable habitat

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status			Habitat	Distribution	Flowering Period
	Fed.	State	CNPS			
San Francisco gumplant <i>Grindelia hirsutula</i> var. <i>maritima</i>	SC		1B	Sandy or serpentine soils in coastal bluff scrub, coastal scrub, valley and foothill grassland; 15 – 400 m	Monterey, Marin, Santa Cruz, San Francisco, San Luis Obispo, and San Mateo Counties	August-September  Known – the taxonomy of this subspecies is uncertain and specimens collected in the Marin Headlands were determined to be this subspecies.
Diablo helianthella <i>Helianthella castanea</i>	SC*		1B	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland; 60 – 1300 m	Alameda, Contra Costa, and San Mateo Counties; extirpated from Marin and San Francisco Counties	April-June  Low - believed extirpated from Marin and San Francisco Counties
Wedgeleaf horkelia <i>Horkelia cuneata</i> ssp. <i>cuneata</i>	SLC*			Old dunes and coastal sandhills; 0-400 m	Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Los Angeles, and San Diego Counties	April-September  Low - not known from Marin County; believed extirpated from the area

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
Kellogg's horkelia <i>Horkelia cuneata</i> ssp. <i>sericea</i>	SC*		1B	Sandy or gravelly openings in closed-cone coniferous forest, maritime chaparral, and coastal scrub; 10 – 200 m	Monterey, Santa Barbara, Santa Cruz, San Luis Obispo, and San Mateo Counties; extirpated from Alameda, Marin, and San Francisco Counties	April-September  Low - believed extirpated from Marin and San Francisco Counties
Coast lily <i>Lilium maritimum</i>	SC*		1B	Broadleaved upland forest. Closed-cone coniferous forest, coastal prairie, coastal scrub, freshwater marshes and swamps, North coast coniferous forest; 2 – 185 m	Mendocino, Marin, and Sonoma Counties; extirpated from San Mateo County; distribution in San Francisco uncertain but extirpated if once found there	May-July  Low - not known from Marin County; believed extirpated from the area
Large-flowered linanthus <i>Linanthus grandiflorus</i>	SC		4	Coastal bluff scrub, Closed-cone coniferous forest, cismontane woodland, coastal dunes, coastal prairie, coastal scrub, valley and foothill grassland; usually in sandy soils; 5-1220 m	Contra Costa, San Francisco, San Mateo, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern, Orange, San Diego, Imperial, Riverside, San Bernardino, and Inyo Counties	April-August  Moderate
Rose linanthus <i>Linanthus rosaceus</i>	SC*		1B	Coastal bluff scrub; 0 – 100m	Known from only one occurrence near Pacifica, San Mateo County; extirpated from Marin, San Francisco, and Sonoma Counties	April-June  Low - believed extirpated from Marin and San Francisco Counties

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State	CNPS			
Marsh microseris <i>Microseris paludosa</i>	SLC*		1B	Closed –cone coniferous forest, cismontane woodland, coastal scrub, valley and foothill grassland; 5 – 300 m	Mendocino, Monterey, Marin, Santa Cruz, San Luis Obispo, and Sonoma Counties; extirpated from San Francisco and San Mateo Counties	April-June  Moderate
Curly-leaved monardella <i>Monardella undulata</i>	SC*		4	Sandy soils in closed-cone coniferous forest, chaparral, coastal dunes, coastal prairie, coastal scrub, and lower montane coniferous forest; 0 – 305 m	Monterey, Marin, Santa Barbara, Santa Cruz, San Francisco, San Luis Obispo, San Mateo, and Sonoma Counties	May-September  Moderate
Skunkbush <i>Navarretia squarrosa</i>	SLC			Open, wet, gravelly flats in mixed coniferous forest, Northern oak woodland, and foothill woodland; 0 - 800 m	Del Norte, Humboldt, Mendocino, Sonoma, Napa, Marin, Contra Costa, San Francisco, Alameda, San Mateo, Santa Clara, Santa Cruz, Monterey, San Benito, San Luis Obispo, and Santa Barbara Counties	June-August  None – no suitable habitat
California broomrape <i>Orobancha californica</i> ssp. <i>californica</i>	SLC			Sandy or heavy soils in coastal bluffs; generally occurs on Grindelia; 0-150 m	Mendocino, Sonoma, Marin, San Mateo, Monterey, and San Luis Obispo Counties	June-October  Moderate
Coast rein orchid <i>Piperia elegans</i>	SLC			Dry, open sites in chaparral, foothill woodland, yellow pine forest, red fir forest, northern coastal scrub, closed-cone pine forest; 0-500 m	Del Norte, Humboldt, Shasta, Mendocino, Solano, Sonoma, Napa, Lake, Marin, Contra Costa, San Francisco, Alameda, Tehama, San Mateo, Santa Clara, Santa Cruz, Monterey, San Benito, San Luis Obispo, and Santa Barbara Counties	May-September  Moderate
Choris's popcorn flower <i>Plagiobothrys chorisianus</i> var. <i>chorisianus</i>	SC*		1B	Mesicites in chaparral, coastal prairie, coastal scrub; 15 – 100 m	Santa Cruz, San Francisco, and San Mateo Counties; extirpated from Alameda County	March-June  Low - not known from Marin County

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
San Francisco popcornflower <i>Plagiobothrys diffusus</i>		E	1B	Coastal prairie, valley and foothill grassland; 60 – 360 m	Known from fewer than ten occurrences in Alameda and Santa Cruz Counties; extirpated from San Francisco County	March-June Low – only marginal habitat present
Fort Ross allocarya <i>Plagiobothrys reticulatus</i> var. <i>rossianorum</i>	SC*			Moist places in forests and grasslands; 0 - 300 m	Humboldt, Mendocino, Trinity, Sonoma, Marin, San Francisco, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, and San Diego Counties	May-June Low – only marginal habitat present
Adobe sanicle <i>Sanicula maritima</i>	SC	R	1B	Serpentine clay in chaparral, coastal prairie, meadows and seeps, valley and foothill grassland; 30 – 240 m	Known from fewer than ten occurrences in Monterey and San Luis Obispo Counties; extirpated from Alameda and San Francisco Counties	February - May Low – not known from Marin County; believed extirpated from the area
Mission Dolores campion <i>Silene verecunda</i> ssp. <i>verecunda</i>	SC		1B	Sandy soil in coastal bluff scrub, chaparral, coastal prairie, coastal scrub, valley and foothill grassland; 30 – 645 m	Known from fewer than 20 occurrences in Santa Cruz, San Francisco, and San Mateo Counties	March-August Low – not known from Marin County
Pacific cordgrass <i>Spartina foliosa</i>	SLC			Coastal salt marsh, mudflats, shores; 0-10 m	Del Norte, Humboldt, Mendocino, Sonoma, Napa, Marin, Solano, San Francisco, Alameda, San Mateo, Santa Clara, Santa Barbara, Ventura, Orange, and San Diego Counties	July-November None – no suitable habitat
Seashore starwort <i>Stellaria littoralis</i>	SC*		4	Bogs and fens, coastal bluff scrub, coastal dunes, coastal scrub, marshes and swamps; 5 – 40 m	Humboldt, Marin, San Francisco, Sonoma; extirpated from Mendocino County	March-July Moderate

## Special-Status Plant Species

Other Species of Concern in Project Area (per October 2003 USFWS species list):						
Species	Listing Status		Habitat	Distribution	Flowering Period	Potential for Occurrence
	Fed.	State				
Dune tansy <i>Tanacetum camphoratum</i>	SC		Coastal strand, coastal dunes; 0 – 30 m	Del Norte, Humboldt, Mendocino, Marin, San Francisco, San Mateo, and San Joaquin Counties	June-September	None – no suitable habitat
San Francisco owl's clover <i>Triphysaria floribunda</i>	SC		Coastal prairie, coastal scrub, valley and foothill grassland/ usually serpentine; 10 - 160 m	Marin, San Francisco, and San Mateo Counties	April-June	Moderate
California triquetrella moss <i>Triquetrella californica</i>	SLC		Coastal bluff scrub, coastal scrub/ immediately downslope of outcropping boulders in coastal grasslands	Coastal counties from central Oregon to southern California	NA	Moderate

### U.S. Fish and Wildlife Service (USFWS) Federal Listing Categories:

- E Federally listed as Endangered
- T Federally listed as Threatened
- SC Species of Concern
- SLC Species of Local Concern - includes species of local or regional concern or conservation significance
- \* Possibly extirpated from the area

### California Department of Fish and Game (CDFG) State Listing Categories:

- E Listed as Endangered in California
- T Listed as Endangered in California
- R Listed as Rare in California

### California Native Plant Society (CNPS) Listing Categories:

- 1B Plants rare, threatened, or endangered in California and elsewhere
- 2 Plants rare, threatened, or endangered in California but more common elsewhere
- 3 Plants for which more information is needed
- 4 Plants of limited distribution – a watch list

# Listed Wildlife and Aquatic Species Considered for Effects Analyses under the Marin Headlands - Fort Baker Transportation Management Plan Biological Assessment

Scientific Name	Common Name	Legal Status			Habitat requirement and/or association	Micro habitat	General Species Distribution / Range	Addressed in MH-FB TMP BA?	Comments
		Federal	CNPS	State					
INVERTEBRATES									
<i>Callophrys mossii bayensis</i>	San Bruno elfin butterfly	FE	n/a	X	Rocky outcrops and cliffs in coastal scrub habitat.	The larval host plant for san bruno elfins is <i>sedum spathulifolium</i> , a succulent which grows on rocky, north-facing slopes along the coast.		No	Species occurrences at Milagra Ridge and Sweeney Ridge (NPS, 2004). No occurrences in project area.
<i>Haliotis sorenseni</i>	white abalone	FE	n/a		Subtidal marine habitat			No	San Mateo and Santa Clara. Historic distribution from Pt. Conception, CA to Baja California, Mexico. Project does not affect the subtidal zone.
<i>Icaricia icarioides ssp. missionensis</i>	Mission blue butterfly	FE	n/a	X	Mission blue butterflies are closely tied to three lupine larval host plants— <i>lupinus albus</i> , <i>l. Varicolor</i> , and <i>l. Formosus</i> . These host plants tend to occur on grasslands on thin, rocky soils within broader coastal-scrub habitats.			Yes	Found in Marin Headlands, Tennessee Valley, Milagra, and Sweeney Ridges (NPS, 2004).
<i>Speyeria zerene myrtilae</i>	Myrtle's silverspot butterfly	FE	n/a		Coastal dunes, scrub, and grassland.	Closely associated with larval and food plants violet ( <i>Viola adunca</i> ) in areas sheltered from the wind below 820 feet within 3 miles of the coast.	Western Marin & Southwest Sonoma Counties	No	Not observed in GGNRA, not likely to be present in study area (NPS, 2004)
<i>Syncaris pacifica</i>	Californian fresh water shrimp	FE,SE	n/a	X	Streams of 12 -36 inches in depth with exposed live roots of trees along under cut banks >6" with over hanging woody debris		Tributary streams in the lower Russian River drainage westward to the pacific Ocean	No	Found in Lagunitas Creek watershed. Surveys in the Rodeo Creek were negative (NPS, 2005).
FISH									
<i>Acipenser medirostris</i>	Green sturgeon	FC	n/a	X	Spawn in the Sacramento River and the Klamath River.	Spawn at temps between 8-14 c. Preferred spawning substrate is large cobble, but can range from clean sand to bedrock.		No	A mostly marine-estuarine species that is only known to spawn in large CA rivers (Sacramento and Klamath). Does not occur in streams/waters that may be affected by project.
<i>Eucyclogobius newberryi</i>	Tidewater goby	FE	n/a	X	Brackish water habitats along the calif coast from Agua Hedionda lagoon, San Diego Co. To the mouth of the Smith River.	Found in shallow lagoons and lower stream reaches, they need fairly still but not stagnant water & high oxygen levels.		Yes	Found in Rodeo Lagoon.
<i>Hypomesus transpacificus</i>	delta smelt	FT	n/a		Spawning and rearing mostly in Sacramento-San Joaquin Delta.	Brackish water in the Sacramento-San Joaquin Delta.		No	Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus kisutch</i>	Coho salmon-- Central California coast	FT,SE, CH	n/a	X	Coastal streams draining to ocean (including those to S.F. Bay) with spawning, juvenile rearing habitat, and migratory corridor			No	Present in Muir Woods, Redwood Creek (NPS, 2004). Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus mykiss</i>	Steelhead — Central California Coast	FT	n/a	X	Coastal streams draining to ocean (including those to S.F. Bay) with spawning , juvenile rearing habitat, and migratory corridor			Yes	May have the listed form of steelhead. Genetic studies being conducted, but may not be conclusive. Will assume presence.



# Listed Wildlife and Aquatic Species Considered for Effects Analyses under the Marin Headlands - Fort Baker Transportation Management Plan Biological Assessment

Scientific Name	Common Name	Legal Status			Habitat requirement and/or association	Micro habitat	General Species Distribution / Range	Addressed in MH-FB TMP BA?	Comments
		Federal	CNPS	State					
<i>Oncorhynchus mykiss</i>	Steelhead — Central Valley	FT	n/a	X	Spawning and juvenile rearing habitat in Sacramento and San Joaquin Rivers and their tributaries			No	Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus tshawytscha</i>	Chinook salmon — Sacramento River winter run	FE, CH	n/a	X	Spawning and juvenile rearing habitat in Sacramento River and tributaries			No	Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. Critical habitat includes Bay waters to the Golden Gate Bridge. Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus tshawytscha</i>	Chinook salmon — California coastal	FT	n/a		Spawning and juvenile rearing in large coastal stream and rivers draining to ocean.			No	Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS). Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus tshawytscha</i>	Chinook salmon — Central Valley spring run	FT	n/a	X	Adult nos depend on pool depth & volume, amount of cover, & proximity to gravel. Water temps >27 c lethal to adults	Federal listing refers to pops spawning in Sacramento River & tributaries.		No	Adult and juvenile migratory corridor along S.F. Bay portion of GGNRA lands. Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS). Does not occur in streams/waters that may be affected by project.
<i>Oncorhynchus tshawytscha</i>	Chinook salmon — Central Valley fall/late fall run	CH, FC	n/a	X	Populations spawning in the Sacramento & San Joaquin Rivers and their tributaries.			No	Spawning, juvenile rearing habitat, and migratory corridor only in Lagunitas Creek (managed by PRNS). Does not occur in streams/waters that may be affected by project.
<i>Pogonichthys macrolepidotus</i>	Sacramento splittail	FT	n/a		Endemic to the lakes and rivers of the central valley, but now confined to the delta, Suisun Bay & associated marshes.	Slow moving river sections, dead end sloughs. Require flooded vegetation for spawning & foraging for young.		No	Found in San Joaquin-Sacramento Delta. Does not occur in streams/waters that may be affected by project.
<b>REPTILES/AMPHIBIANS</b>									
<i>Rana aurora draytonii</i>	California red-legged frog	FT, CH	n/a	X	Ponds and other permanent slow-moving waterbodies: lakes, reservoirs, slow streams, marshes, and bogs.	Adult require a dense, shrubby or emergent riparian vegetation closely associated with deep (>0.7 meters) still or slow-moving water.		Yes	Present at various localities within Marin and San Mateo Counties (NPS, 2004). Known to breed in Rodeo Lake and may also occur in Rodeo Creek.
<b>BIRDS</b>									
<i>Brachyramphus marmoratus marmoratus</i>	Marbled murrelet	FT, CH	n/a	X	Old growth forest for breeding and sheltered waters/open coast for foraging.		Nests inland, usually in trees. Fairly common in breeding range; rare in Southern California.	No	Habitat present in Muir Woods, but no detections in 2 years of surveys (NPS, 2004). No suitable habitat in project area.
<i>Charadrius alexandrinus nivosus</i>	Western Snowy plover	FT, CH	n/a	X	Coastal beaches, sand spits, dune-backed beaches, beaches at river mouths, salt pans at lagoons and estuaries, mud flats, and man-made salt ponds.			Yes	Overwintering population on Ocean Beach. Periodically sighted at other beaches; however, there are no known occurrences at Rodeo Beach.

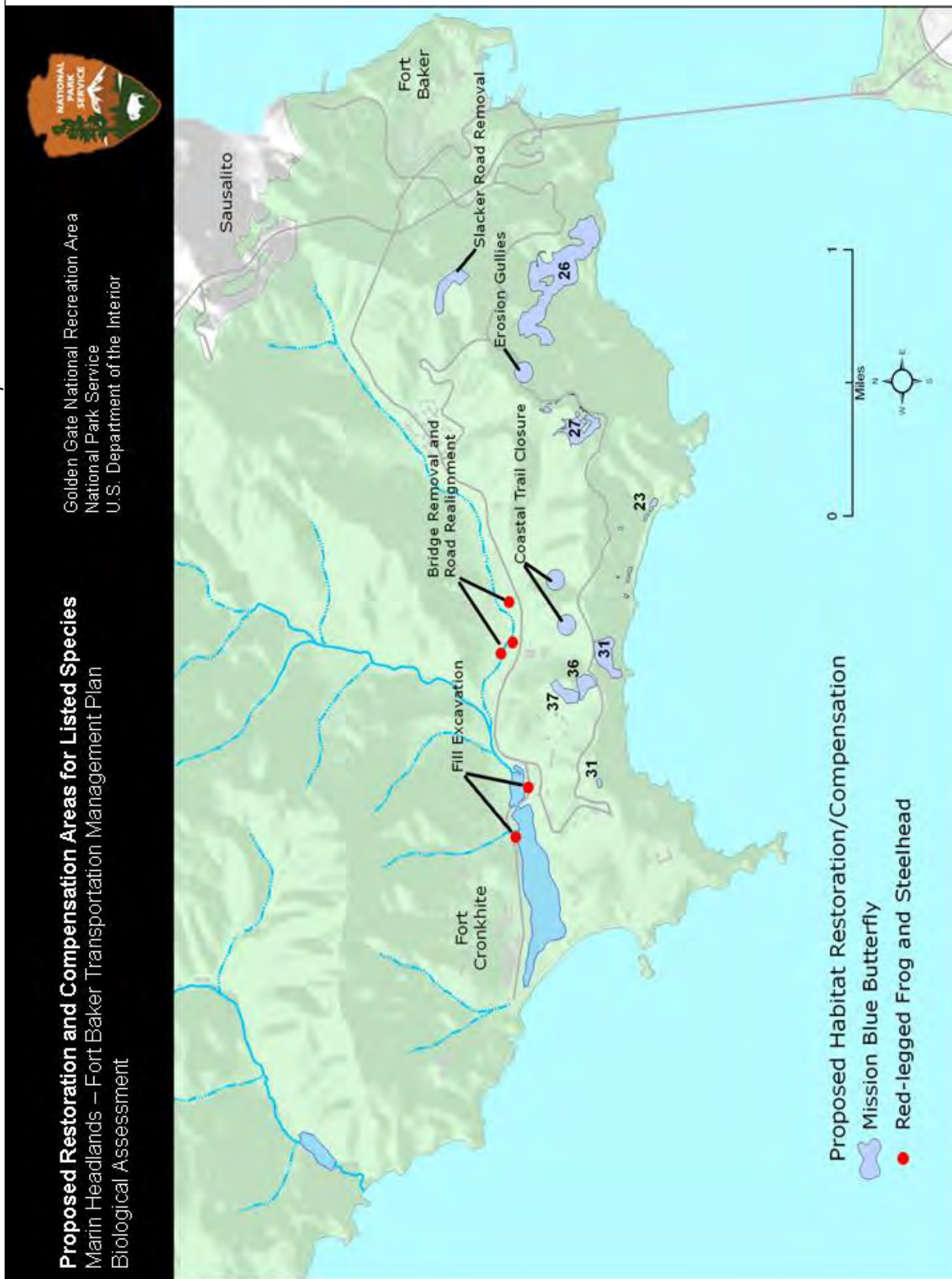
# Listed Wildlife and Aquatic Species Considered for Effects Analyses under the Marin Headlands - Fort Baker Transportation Management Plan Biological Assessment

Scientific Name	Common Name	Legal Status			Habitat requirement and/or association	Micro habitat	General Species Distribution / Range	Addressed in MH-FB TMP BA?	Comments
		Federal	CNPs	State	Noted in GGNRA Records				
<i>Coccyzus americanus occidentalis</i>	Western yellow-billed cuckoo	FC				(Nesting) riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, w/ lower story of blackberry, nettles, or wild grape.	No	Extremely rare. Not known to nest in study area.
<i>Haliaeetus leucocephalus</i>	Bald eagle	FT			X	Large trees near lakes, rivers, or estuaries for foraging. Disturbance intolerant		No	No known occurrences. The project is not likely to affect this species.
<i>Pelecanus occidentalis</i>	Brown pelican	FE FP	n/a		X	Forage over and near shore marine areas including open coast, San Francisco Bay, and Rodeo Lagoon. Utilize islands, rocks, cliffs, and some protected beach areas for roosting.		Yes	Non-breeding. Bird Island is a large roosting site and Rodeo Lagoon important for foraging and bathing.
<i>Rallus longirostris obsoletus</i>	California clapper rail	FE FP	n/a			Salt marsh with tidal channels.		No	No known occurrences within project area.
<i>Sterna antillarum browni</i>	California least tern	FE FP	n/a		X	Diked ponds or ditches along shorelines.		No	No known occurrences within project area.
<i>Strix occidentalis caurina</i>	Northern spotted owl	FT	n/a		X	Utilizes coniferous and mixed-hardwood forest areas for breeding in the project area, often in drainages.		No	No suitable habitat in project area.
<b>MAMMALS</b>									
<i>Arctocephalus townsendi</i>	Guadalupe fur seal	FT FP	n/a			Protected haul out sites.		No	No haul out sites in project study area. Offshore marine species will not be affected by proposed activities.
<i>Balaenoptera borealis</i>	Sei whale	FE	n/a			Offshore marine		No	Offshore marine species will not be affected by proposed activities.
<i>Balaenoptera musculus</i>	Blue whale	FE	n/a			Offshore marine		No	Offshore marine species will not be affected by proposed activities.
<i>Balaenoptera physalus</i>	Finback whale	FE	n/a			Offshore marine		No	Offshore marine species will not be affected by proposed activities.
<i>Enhydra lutris nereis</i>	Southern sea otter	FT FP	n/a		X	Near shore marine		No	No large kelp forests present in project study area. Observed at Fitzgerald Marine Reserve. Offshore marine species will not be affected by proposed activities.
<i>Eubalaena glacialis</i>	Right whale	FE FP	n/a			Offshore marine		No	Offshore marine species will not be affected by proposed activities.
<i>Eumetopias jubatus</i>	Steller sea lion	FT, CH	n/a		X	Protected haul out sites.		No	Historic haul-out at Seal Rock, San Francisco. No haul out sites in project study area. Offshore marine species will not be affected by proposed activities.
<i>Megaptera novaeangliae</i>	Humpback whale	FE	n/a		X	Offshore marine		No	Offshore marine species will not be affected by proposed activities.

# Listed Wildlife and Aquatic Species Considered for Effects Analyses under the Marin Headlands - Fort Baker Transportation Management Plan Biological Assessment

Scientific Name	Common Name	Legal Status			Habitat requirement and/or association	Micro habitat	General Species Distribution / Range	Addressed in MH-FB TMP BA?	Comments
		Federal	CNPs	State					
<i>Physeter catodon</i>	Sperm whale	FE	n/a		Offshore marine			No	Offshore marine species will not be affected by proposed activities.
<i>Reithrodontomys raviventris</i>	Salt marsh harvest mouse	FE/FP	n/a		Salt marsh, wetland.			Yes	Found in inventories at Rodeo Lagoon (USGS); however, likely species was misidentified - no confirmed occurrences within project area.
<b>CA Fully Protected</b>									
<i>Falco peregrinus anatum</i>	American peregrine falcon	FSC FP	n/a		(Nesting) near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures.	Nest consists of a scrape on a depression or ledge in an open site.		No	It is anticipated that the wetland coastal habitat supporting this species would not be affected by proposed activities.
<i>Elanus leucurus</i>	White-tailed kite	FSC FP	n/a		(Nesting) rolling foothills/valley margins w/scattered oaks & river bottomlands or marshes next to deciduous woodland	Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.		No	White-tailed kites could be beneficially affected because raptors in general are unaffected or respond favorably to burned habitat (Smith, 2000). However, white-tailed kites, and other canopy nesters could be subject to short-term negatives affects as a result of crown fires.
<i>Laterallus jamaicensis coturniculus</i>	Black rail	CA/FP	n/a		Mainly inhabits salt-marshes bordering larger bays.	Occurs in tidal salt marsh heavily grown to pickleweed; also in fresh-water and brackish marshes; all at low elevation.		No	Conduct surveys or assume presence.
<b>KEY: FE (federally endangered), FT (federally threatened), FC (federal candidate), FP (federally protected), FSC (federal species of concern), CH (designated critical habitat)</b>									

**FIGURE D-1. HABITAT RESTORATION AND COMPENSATION AREAS FOR LISTED SPECIES HABITATS UNDER THE MH/FB TMP PROPOSED ACTION**

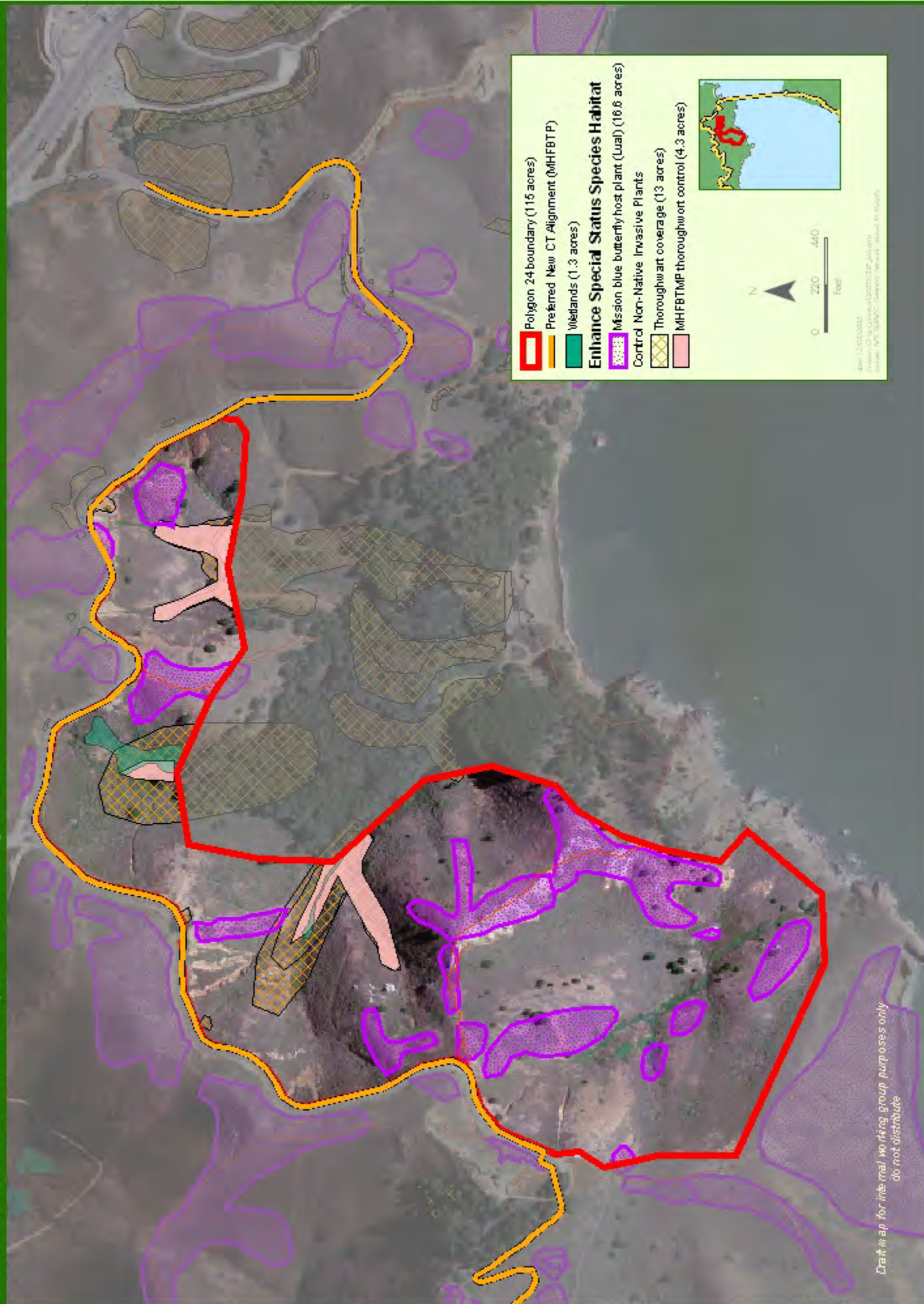




# MHFBTMP Habitat Compensation Project

Coastal Trail Corridor Enhancement Project - MHFBTMP Mitigation Actions

Mission Blue Butterfly Habitat Enhancement and Targeted  
Thoroughwort Removal (Project 24)  
Marin Headlands - Kirby Cove





# MHFBTMP Habitat Compensation Project

Coastal Trail Corridor Enhancement Project - MHFBTMP Mitigation Actions

Mission Blue Butterfly Habitat Protection -  
Targeted Thoroughwort Control (Project 28a)

Marin



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