5.2 NAVIGATION

5.2.1 Significance Criteria

Impacts would be considered significant if they would:

- Affect the safe navigation of the Bay (including commercial shipping), resulting in substantial increases in the number of incidents reported by the Vessel Traffic Service (VTS); and/or
- Interfere substantially with the recreational water uses in San Francisco Bay through increases in the number of accidents involving the interaction of ferries and recreational vessels.

5.2.2 Impacts and Mitigation

Impact NAV-1 **Existing ferry service results in some navigational incidents, including accidents involving collisions, allisions, and groundings. There is a potential for an increase in these incidents with expansion of water transit service.**

Bay Area ferry service currently serves terminals in San Francisco Bay. Most ferry trips are within the Central Bay. Expanded ferry service could add ferry traffic throughout the Bay, depending on the chosen alternative, involving new trips to and from terminals in localities not currently accessed by ferries. This could lead to a potential increase in navigational incidents.

Three passenger service companies currently provide daily service from 5:30 a.m. to 12:30 a.m. In 2000, ferry traffic reached a volume of 88,469 trips, or approximately 68 percent of the total vessel trips reported by the U.S. Coast Guard (USCG) Vessel Traffic Service (VTS) in San Francisco Bay for that year. Alternatives 1, 2, and 3 involve expansion of ferry service and would increase the number of ferry transits in the Bay. Table 5.2.1 shows the number of ferry trips projected for the year 2025 under each alternative. The year 2025 ferry trips for Alternatives 1 through 3 were derived from projections prepared for the WTA as of April 2002. Ferry traffic projections are calculated through modeling and testing of different assumptions and are subject to revision (Bruzzone 2002). For Alternative 4, the No Project Alternative, the number of trips is assumed to remain constant at the levels reported in 2000.

Available data for San Francisco Bay and other heavily used harbor areas in the United States (presented in Table 3.2.4) suggest that there is no direct correlation between the number of vessel transits and the number of reported incidents. This lack of correlation is also depicted on Figure 3.2.4. For example, despite having the lowest number of transits compared to other U.S. ports, Los Angeles/Long Beach had the highest number of reported collisions per 1,000 transits. Similarly, there appears to be no relationship between higher traffic and reports of near misses, groundings, allisions, or other vessel casualties for the main U.S. harbors.

The comparison of number of transits and number of navigational incidents between different harbors could indicate that some harbors are more navigationally dangerous than others, regardless of the number of trips. However, evaluation of navigational incidents within San Francisco Bay over time also does not show a clear correlation of any increase in incidents with

an increase in transits. USCG incident statistics for the Bay for 1996-2001 are presented in Table 3.2.6. The trend indicated is that both ferry and total transit trips by all vessel types generally increase over time. However, over the same period, the number of incidents does not change in a consistent pattern.

This comparison of recorded navigational incidents and vessel traffic statistics does not appear to associate an increase in trips with an increase in the probability of incidents. Other factors appear to affect the occurrence of navigational incidents for any given volume of harbor transits. These may include the condition of mechanical equipment, navigational aids, and training of pilots for safety. It is important to note that Puget Sound and San Francisco Bay are among the harbors with the lowest number of incidents. Ferries represent approximately 80 and 70 percent, respectively, of Puget Sound and San Francisco Bay annual vessel trips. This could imply that ferry pilots familiarity with the navigational conditions and procedures in those harbors account for fewer incidents.

To evaluate the significance of the increased ferry traffic within the overall vessel traffic in San Francisco Bay, two extreme scenarios were evaluated, as represented in Figures 5.2.1 and 5.2.2. The purpose of this evaluation was to capture the possible range of the contribution of passenger ferry transits to the overall vessel traffic in the Bay. In the conservatively low scenario, all non-ferry traffic would remain at year 2000 levels. This scenario does not consider any further expansion in waterborne traffic that would naturally occur in response to regional economic demand. Alternatively, in the conservatively high scenario, non-ferry traffic would continue to grow steadily based on the rates of increase shown in recent years. This scenario does not consider any logistical constraints or infrastructure limitations on the capacity of the Bay to accommodate waterborne traffic. The number of vessel trips in the Bay in each vessel traffic growth scenario is presented in Table 5.2.2.

Under either scenario, the proportion of ferry transits as part of the total vessel transits would increase from the current level of 69 percent corresponding to Alternative 4. This increase indicates that ferries would account for between 92 and 97 percent of the total vessel transits in the Bay under Alternative 1, between 90 and 96 percent under Alternative 2, and between 70 and 86 percent under Alternative 3. That is, under all alternatives, ferry trips would represent the overwhelming majority of all the vessel transits within the Bay.

Incidents such as collisions and near misses involve the interaction of two vessels. A model was developed by ABS Consulting as part of a preliminary risk assessment for the WTA that counts vessel interactions (ABS 2002). Any vessel (i.e., VTS-monitored vessel, recreational boater, or another ferry) within 0.5 miles of a ferry was considered an interaction. An interaction also includes situations in which a vessel is within 5 minutes of crossing track, and the crossing occurs either within 1 mile ahead or within 0.5 mile behind the ferry. The counting does not define the level of risk related to collision. It only provides a measure of hazardous exposure. The ABS model was used to simulate navigational conditions and produce geospatial distribution of vessels for the year 2000 with the ferry fleets and routes corresponding to Alternatives 1 through 3 and Alternative 4 as the base case. The model results shown in table below indicate that as ferry transits expand compared to the base case, interactions between vessels would grow exponentially.

Alternative	Ferry Transits (percent)*	Total Vessel Interactions (percent)*
Alternative 4 (base case)	100	100
Alternative 3	365	620
Alternative 2	1,228	4,600
Alternative 1	1,559	8,400

Data presented as a percentage of the base case results.
Source: ABS (2002)

The increase in the relative number of ferry transits under Alternatives 1, 2, and 3 imply that the potential interactions between ferries would continue to predominate over the interactions between ferries and non-ferry vessels as well as over those between two non-ferry vessels. Consequently, this comparison indicates that proper maintenance of fleets, ferry pilot training, and the use of appropriate navigation aids will be the most important factors in addressing any potential navigation risks created by the additional transits and the increased hazardous exposure created by the increased interactions. As stated before, increased vessel traffic does not correlate with increased navigational incidents in the nation's harbors. Procedures will continue to be more significant than the number of vessel interactions in determining the level of risk.

The WTA ferry expansion will involve different ferry routes, some of which are common to the four alternatives considered. These routes may pose varying degrees of navigational challenge and location-specific navigational concerns. However, ABS modeling results indicate that the majority of the increased interactions will take place within a square grid northeast of the San Francisco cityfront.

Summary of Impact NAV-1

- Alternatives 1 and 2 could have potentially significant impacts on navigational incidents resulting from the increase in the number of ferry transits and service to and from new terminal locations. The level of significance of such impacts is difficult to determine.
- Alternative 3 could have potentially significant impacts on navigational incidents resulting from the increase in the number of ferry transits. The level of significance of such impacts is difficult to determine.
- Alternative 4 would not involve expansion of ferry transits and would therefore have no impact.

Mitigation NAV-1.1: Implementation of best practices as recommended by the preliminary risk assessment prepared by ABS (2002) will serve to minimize navigation-related risk. These practices (ABS 2002) are listed below:

1. Design and implement a preventive maintenance system that meets or exceeds manufacturer's service requirements.
2. Require a licensed master to complete an extended familiarization training program aboard the hull and route before being qualified as master-in-charge. (Note: Program training should meet or exceed the requirements in the USCG National Maritime Center Policy Letter 06-01 subj.: "Qualification for Issuance of Type Rating Endorsements Authorizing Service on High-Speed Craft.")

3. Design the terminal to facilitate docking under both prevailing and seasonal environmental conditions.
4. When conditions make it difficult for the master-in-charge to effectively maintain situational awareness, assign another person to the bridge watch (i.e., another licensed master or a senior deckhand) to share the workload and serve as a safety double check.
5. Design and install gangway systems (1) that help steady the ferry and hold it firmly to its dock, (2) that can be adjusted to accommodate changing environmental forces, and (3) that can be manipulated by crew having different physical abilities.
6. Install, operate, and maintain technology (e.g., portable pilot units, and/or automatic identification system tracking and display) to facilitate communication of intent and to audit conformance with navigational protocols.
7. Install, operate, and maintain a backup radar and separate power supplies for radars.
8. Train/certify all bridge watchstanders in radar operation.
9. Periodically survey the water depth in vicinity of a terminal to identify shoaling, and set and maintain private markers to identify shoal water.
10. Conduct periodic electrical safety inspections and daily check of ground faults. Install a bridge alarm/indicator that alerts the licensed master of the location of electrical shorts.
11. Install and maintain a fixed fire suppression system that has sufficient capacity to flood the engine room twice with CO_2 or equivalent fire suppression agent.
12. Eliminate or minimize hazardous materials used in maintenance and repair.
13. Use a closed gauging system for checking fuel levels.
14. Develop company policy and standard procedures for emergencies and adverse weather and normal operating conditions. Implement and enforce procedures through training and company communications. Audit conformance. Provide job aids for critical procedures.

    Note: Policy and procedures manual and an operational training program should be developed using the guidance in the USCG Navigation and Vessel Inspection Circular 5-01 subj.: "Guidance for Enhancing the Operational Safety of Domestic High-speed Vessels."

    14a. Develop, communicate, and enforce standard operating procedures for ferry startup and shutdown.

    14b. Develop, communicate, and enforce navigational protocols for routes.

    14c. Identify areas/conditions in which meeting, crossing, or overtaking may significantly increase the risk of collision and develop/enforce a "no passing" policy for those areas.

    14d. Develop and exercise vessel mutual assistance plans.

    14e. Develop and exercise emergency response protocols to facilitate communication and ferry traffic control during emergencies.

    14f. Determine with emergency care providers (e.g., ambulance services) locations along a route at which the ferry can transfer people in medical distress.

14g. Develop, communicate, and enforce a hot work permit program.

14h. Develop, communicate, and enforce lock-out/tag-out program.

14i. Develop, communicate, and enforce a safe lifting program for deckhands.

14j. Develop and enforce standards for emergency training. Establish a frequency for emergency drills that meets or exceeds USCG requirements. Establish criteria for measuring drill performance. Require all shifts and all crew on each shift to participate. Document training.

Impact After Mitigation: Impact NAV-1 would be reduced after implementation of Mitigation Measure NAV-1.1. Ferry transit has operated safely on the Bay, and expansion of service with these measures would minimize risks. However, no system can ensure risk-free navigation conditions in the Bay. This impact is potentially significant because of the remaining risk.

Impact NAV-2 **Increased numbers of ferry transits in the Bay may increase the risk of incidents (such as collision and near misses) between recreational water users and ferries. This raises concerns for public safety, especially where windsurfers launch and sail in close proximity to ferry vessels.**

Windsurfers typically do not use the Bay marinas. Rather, different launching facilities have developed in the Bay Area because of the need for particular site amenities for that sport, such as shore accessibility and parking, and to take advantage of particular wind and water conditions. The desire to avoid conflicts with other user groups also plays a role in the selection of launch sites. No accidents involving windsurfers and ferries have been documented to date.

Figure 3.2.3 presents the location of existing launch sites relative to existing and proposed ferry terminals. The figure also shows the season during which best windsurfing conditions prevail at each location and, therefore, when these locations are most heavily used. The following proposed terminals would be located in the vicinity of an existing launch site: Benicia, Martinez, Crissy Field, Oyster Point, San Francisco International Airport, and Coyote Point.

Larkspur is the only existing ferry terminal located close to a windsurf launch site. No windsurfing accidents have been reported by ferry operators at the Larkspur terminal even though windsurfing has been a popular recreational activity in the area for many years. This may be attributed to the fact that ferries travel at slow speeds (10 knots) near the terminal and can quickly stop if a windsurfer falls along their path (Clark 2002). No written navigational rules exist for windsurfers, but windsurfers are reported to honor the ferries' approach and departure route since ferries are restricted to the dredged channel. Depending on wind and tide conditions, windsurfers generally sail within a 1-2 mile radius from their launch sites. Windsurfers require a minimum wind speed of 9 knots and typically sail with winds ranging from 15 to 30 knots. Consequently, in the areas where interaction between windsurfers and ferries might occur, windsurfers may be sailing at higher speeds than ferries. On occasion, ferries pick up windsurfers who drift too far from shore and are unable to return. The navigational situation and relationship between ferry operators and windsurfers is reportedly agreeable, and each group is said to "look out for each other" (Clark 2002).

That view of the situation was corroborated by Tom Lloyd, owner of Boardsports Marin located at Larkspur Landing and an experienced windsurfer in the Larkspur channel. Mr. Lloyd noted that "ferries usually honk their horn to alert a windsurfer who has either not noticed the ferry is approaching or who has lost control of their board so that they can get out of the ferry's way. As

long as the two groups communicate and stay aware of their surroundings, there shouldn't be any problems." (Lloyd 2002). The North Bay Chapter of the San Francisco Boardsailing Association monitors the activities between windsurfers and other vessels, including ferries, near Larkspur Landing to ensure a safe recreational environment for their members.

Summary of Impact NAV-2

- Alternatives 1 and 2 would increase the number of ferry transits in the Bay and expand service to and from new terminal locations. Some of those proposed terminals could be located in the vicinity of windsurf launch sites. The impact of increased ferry traffic on windsurfers could be potentially significant.
- Alternative 3 would increase the number of ferry transits in the Bay but would not require new terminals in locations close to launch sites. The impact of increased ferry traffic on windsurfers could be potentially significant.
- Because Alternative 4 does not involve an increase in ferry traffic or new terminals, there would be no significant impact.

Mitigation NAV-2.1: Appropriate training of ferry crew in new terminals located near existing windsurfing launch sites could reduce the risk of incidents involving ferries and windsurfers. The San Francisco Boardsailing Association should participate in the development and delivery of such training.

Mitigation NAV-2.2: Designation of specific ferry employees to stand watch on the bridge of ferries at select routes to watch for navigational hazards (i.e., during periods of high use by windsurfers within the vicinity of selected terminal locations) could reduce the risk of incidents involving ferries and windsurfers.

Impact After Mitigation: Impact NAV-2 would be reduced after implementation of Mitigations NAV-2.1 and NAV-2.2. As exemplified by the case of the Larkspur terminal, windsurfers and ferry crews will "look out for each other" and develop a relationship that will serve to minimize incidents. No system can ensure risk-free navigation conditions in the Bay, and this impact remains potentially significant for Alternatives 1 through 3.

Impact NAV-3 **Increased numbers of ferry transits in the Bay may lead to an increased risk of collision between recreational boaters and ferries.**

As the population of the Bay region increases, more people are expected to use their leisure time in water-oriented recreational activities. According to USCG information, California has 904,863 registered boats in 2000 and ranks second (after Michigan) among the states in the number of registered recreational vessels (motor and non-motor watercraft). Accident statistics indicate that in 2000 there were a total of 900 boat accidents in California, involving 49 deaths and 519 injuries and totaling $3 million in property damages. One third of all California boat accidents that year involved collisions with other recreational vessels. A similar proportion was observed nationwide, with 2,706 accidents out of a total 7,740 involving collision with other vessels (USCG No Date). The majority of accidents between recreational boats are caused by improper control of the vessels due to operator recklessness. National and state statistics of boating accidents do not indicate that there were any accidents involving ferries and recreational boats. The 1996-2001 record of ferry accidents indicates only one collision during that period and it did not involve a recreational boat.

Figure 3.2.1 presents the locations of marinas along the San Francisco Bay shoreline, where local recreational water users berth or store their vessels. While most marinas are concentrated in the Central Bay, once vessels are launched, they can travel virtually anywhere in San Francisco Bay, San Pablo Bay, and the Sacramento River Delta, depending on the capabilities of the vessel and the operator. Therefore, there is potential for interaction between ferries and recreational boaters along any of the existing and potential future ferry routes.

Requirements for the safe interaction between power-driven vessels and between power-driven and sailing vessels are delineated in the International Regulations for Preventing Collision at Sea, Inland Navigation Rules Part B – Steering and Sailing, Rule 18. These regulations govern open bodies of water in which foreign shipping traffic is possible and provide a set of statutory requirements designed to promote navigational safety. These rules include requirements for navigation lights, dayshapes, and steering, as well as sound signals for both good and restricted visibility.

General public education and specific boat operator training in regard to safe operation of boats, appropriate rescue and life-saving equipment, boating under the influence of drugs and alcohol, and other key topics is widely recognized as an important tool to prevent and reduce watercraft accidents. The Federal Boating Safety Act of 971 (recodified under Title 46 of the United States Code) gave the USCG authority to administer two separate grant programs aimed at recreational boating safety. These are a State Grant Program to assist U.S. states and territories and an award program for nonprofit public service organizations to support recreational boating safety activities.

Boating activities in the Bay Area are well organized. Sail races are scheduled and planned well in advance of the events. USCG, the California Department of Boating and Waterways, marina associations, yacht clubs, and community-based entities such as Boat U.S. Foundation have collaborated extensively in matters of boating education and improving recreational navigation safety in Northern California.

Summary of Impact NAV-3

- Alternatives 1 and 2 would increase the number of ferry transits in the Bay and expand service to new terminal locations. Alternative 3 would increase the number of ferry transits in the Bay. The increase in the potential for incidents between recreational vessels and increased ferry traffic is potentially significant.
- Because Alternative 4 does not involve an increase in ferry traffic or new terminals, there would be no impact.

Mitigation NAV-3.1: Additional training, education, and public advisory programs for recreational watercraft users related to navigation safety requirements could reduce the risk of incidents associated with expanded ferry service in the Bay. The WTA could fund or sponsor new education and advisory training programs and strengthen existing ones. Potentially affected recreational users, especially those docking at marinas located in the vicinity of proposed new ferry terminals, could be reached through public notices on ferry routes and schedules.

Mitigation NAV-3.2: Designation of specific ferry employees to stand watch on the bridge of selected ferries to watch for navigational hazards (i.e., during periods of high recreational use,

such as weekends or race events, or when weather hazards exist) could reduce the risk of navigational incidents.

Impact After Mitigation: Impact NAV-3 would be reduced after implementation of Mitigations NAV-3.1 and NAV-3.2. No system can ensure risk-free navigation conditions in the Bay. This could be a potentially significant impact.

References

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Bruzzone, Tony, 2002. PTM, Personal Communication, April.

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Lloyd, Tom. 2002. Boardsports Marin. Personal Communication. April.

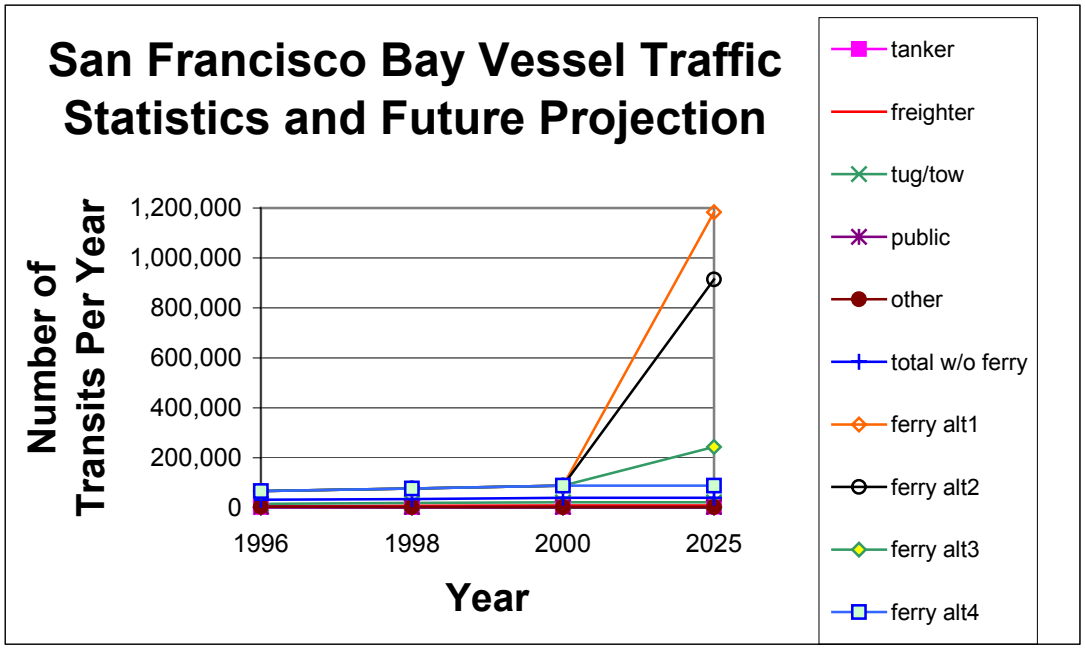
U.S. Coast Guard (USCG). No Date. www.uscgboating.org

Table 5.2.1
Projected Ferry Trips in 2025

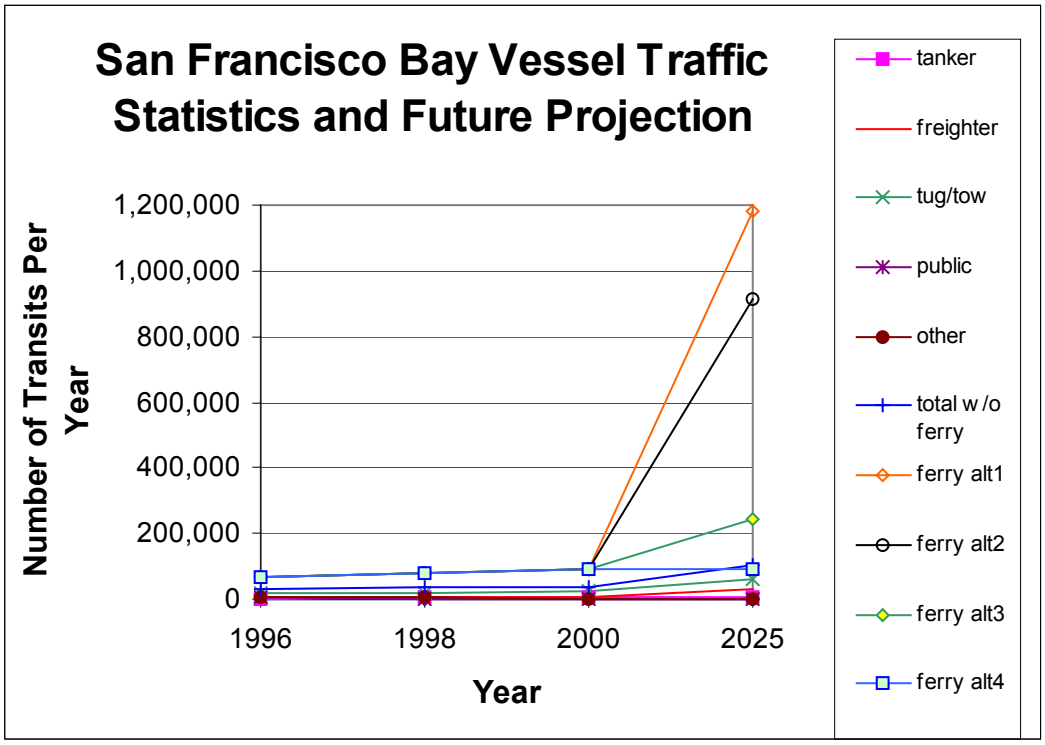
	Number of Projected Annual Ferry Transits
Alternative 1	1,182,980
Alternative 2	914,180
Alternative 3	243,440
Alternative 4	88,469

Table 5.2.2
Projected 2025 Annual Vessel Transits in San Francisco Bay

		2025 Non-Ferry No Growth			2025 Sustained Non-Ferry Growth		
	Ferry Transits	Non-Ferry Transits	Total Transits	% Ferry Transits	Non-Ferry Transits	Total Transits	% Ferry Transits
Alternative 1	1,182,980	39,235	1,222,215	97	103,962	1,286,942	92
Alternative 2	914,180	39,235	953,415	96	103,962	1,018,142	90
Alternative 3	243,440	39,235	282,675	86	103,962	347,402	70



URS	Water Transity Authority Program EIR Project No. 28066519	2025 FERRY TRANSIT PROJECTIONS AND NO GROWTH IN NON-FERRY VESSEL TRIPS	Figure 5.2.1



URS	Water Transity Authority Program EIR Project No. 28066519	2025 FERRY TRANSIT PROJECTIONS AND SUSTAINED GROWTH IN NON-FERRY VESSEL TRIPS	Figure 5.2.2