

US Sailing Independent Review Panel Inquiry into the Low Speed Chase Capsize during the Full Crew Farallones Race on 14 April 2012

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Objective - The objective of this report is to reduce the chance of future similar tragedies by investigating the causes leading up to this incident, examining the use of safety gear, and understanding failures in communication during the event. It is not intended to be used in any judicial proceedings whose purpose is to attribute or apportion liability or blame.

Synopsis

On April 14, 2012, at 14:36:40 PDT, while racing in the Full Crew Farallones Race out of San Francisco, CA, the sailing vessel Low Speed Chase, with eight crew aboard, encountered breaking waves when rounding Maintop Island, the northwest point of SE Farallon Island. The vessel, a Sydney 38, was less than 0.2 nautical miles (400 yards) from the point, crossing a 4-fathom shoal at near-low tide in a 25-knot northwest wind on a heading of approximately 235° magnetic. The morning forecast predicted “wind waves 3 to 7 feet, NW swell 12 to 15 feet at 13 seconds.” A set of larger than average waves capsized the boat and drove it onto the rocky shore. Seven of the eight crew members were thrown into the water. Two of those in the water made it to shore and survived, but five did not. One of the survivors rode the boat to shore.

On April 26th, USCG San Francisco Sector Captain Cynthia Stowe called for a ‘stand-down’ restricting offshore races to stay within the demarcation line running from Point Bonita to Land’s End. The stated purpose was to give San Francisco offshore sailboat racing organizations a chance to review their racing safety protocols and seek improvement. The Coast Guard invited US Sailing, the national governing body of sailing in the United States, to investigate the circumstances in an attempt to make offshore racing safer. This report was requested by US Sailing President Gary Jobson with the approval of US Sailing’s Board of Directors. A panel of five prominent offshore sailboat racing experts was selected by US Sailing, and this report is the result of the panel’s efforts.

Synopsis of findings: As a result of the panel’s investigation, it became clear that the cause of the capsized was that Low Speed Chase sailed a course which took them across a shoal area over which breaking waves could be expected to occur several times per hour (see [Appendix D](#)) and encountered a breaking wave, which capsized the boat. There are several ways to calculate the depth in which waves are likely to break.¹ Of the range of depths resulting from the various accepted calculations, the minimum reasonable depth for these conditions would have been 43 feet. The capsized occurred in approximately 28 feet of depth. If the crew of Low Speed Chase had sailed in deeper water, they could have prevented the tragedy. Although the course sailed was the direct cause of the capsized, there were additional safety issues that came to light during the investigation, which may have mitigated the outcome. A secondary issue involved the personal safety gear in use on Low Speed Chase (life jackets and harnesses). Improvement in the personal safety gear might have prevented some of the deaths on Low Speed Chase. There is a third level of consideration involving existing communication difficulties and discipline among the entire fleet and a fourth concerning race management. These additional issues did not affect the outcome of this event, but improvements in these areas might save lives or reduce injuries in future accidents. The only prevention would have been more conservative course selection to avoid shallow water in breaking seas on a lee shore.

The safety issues to be examined in this report include:

1. Failure of seamanship in negotiating shoal waters on a lee shore;
2. Inadequate personal safety gear in use for offshore conditions;

3. Limited communication infrastructure hampering race committee-to-race boat communications;
4. Race management protocol flaws creating uncertainty surrounding search and rescue efforts.

1.0 Facts: The factual information was gathered through extensive interviews, review of available GPS tracking and weather data, and questionnaire response. In addition, the team relied on the depth of the panel's sailing experience.

1.1 Race Information – The Full Crew Farallones Race was held on April 14, 2012 with the first start at 09:45. The start and finish were at the St. Francis Yacht Club. The course was around the Southeast Farallon Islands in either direction. The calculated distance of the race was 58 nautical miles.

1.1.1 Race Management: The Organizing Authority for the race was the Yacht Racing Association (YRA) of San Francisco Bay. The race was part of the Ocean Yacht Racing Association (OYRA) Offshore Race Series. The sponsor yacht club, which supplied the race committee, was the San Francisco Yacht Club. This race and all Ocean Yacht Racing Association races are designated Category 2 races.²

A Marine Event Permit (MEP) to conduct the event was issued by the U.S. Coast Guard (CG) Sector San Francisco Department of Waterways Management on April 5, 2012. This permit was issued with numerous associated conditions including submission of participant information, communications with the CG and Vessel Traffic Service, and maintaining 100% accountability for all participants. Several of the conditions and requirements associated with the permit were not fully met. (See [Appendix A](#) for complete MEP conditions.)

The Principal Race Officer (PRO) and other members of the race committee were not familiar with all of the current conditions and requirements associated with the MEP for offshore races. A package of documents detailing those conditions and requirements was e-mailed to the PRO on the Thursday evening before the race, but was not read thoroughly. The PRO, though highly experienced in running races, had not run an offshore race in over ten years.³ The race committee had not been trained in areas specific to off-shore race management. The multiple organizing authorities responsible for running off-shore races in the Bay Area have varying safety protocols for managing those races, which hampers the consistent application of standards from one race to the next.

1.1.2 Race Boat requirements to Race: The race was governed by the Racing Rules of Sailing, 2009-2012 (RRS), the Prescriptions of U.S. Sailing, the Notice of Race, and any Rules modified by the Sailing Instructions for OYRA races. The Notice of Race included specific Rules; one was the modifications to the 2011 – 2012 ISAF Offshore Special Regulations Governing Offshore Racing for Monohulls & Multihulls, prescriptions for Category 2 Racing. One of these Rules specified that “RRS 40 is deleted and replaced with “all competitors shall wear adequate personal buoyancy while on deck.”” It was not specified what “adequate personal buoyancy” comprised. There was no provision for a skippers’ meeting or *required* attendance by skipper or crew prior to the race at a Safety at Sea seminar.⁴ The Sailing Instructions also did not include provision for inspections to ensure compliance with the Minimum Equipment Requirements. (See [Appendix A](#) for NOR, SI’s, Special Regulations. For complete ISAF Offshore Regulations, including US Sailing Prescriptions see <http://offshore.ussailing.org/Assets/Offshore/SAS/4+2012+2013+Monohull+Cat+2+Extract.html>)

Each boat in an Offshore Race Series event is required to file a Crew/Boat Information and Statement of Compliance (CBISOC) form with the YRA by close of business on the Thursday prior to the race. These forms contain all crew names and contact information and include the skipper's declaration of compliance with minimum equipment requirements.⁵ Any updates to this information are collected by the YRA during the day on Friday, and by the race committee on race day.⁶ The current paper submission process for assembling required crew and boat information exhibited several weak points, which resulted

in some of the crew information with the race committee not matching the actual crew persons on the boat. One of the MEP conditions is for the race committee to maintain 100% “accountability” of all race participants at all times. There was a point during the search and rescue activity when the Coast Guard requested, but was not able to ascertain, how many and which boats were still on the race course.

The Sailing Instructions for the race required all boats to check in with the race committee via VHF channel 69 prior to the start of the race. Radio discipline during the check-in period was poor.⁷ Forms and procedures used for check-in by the race committee did not provide for capturing all of the required information or identifying discrepancies with the CBISOC. As a result, crew information for some boats starting the race was incomplete or inaccurate.⁸

- 1.1.3** Entries: Sixty boats were initially entered in the race with Low Speed Chase scheduled to start with the first division. There were 32 finishers. Some boats did not start, some withdrew due to missing the start, while others withdrew during the race for a variety of reasons including seasickness and gear failures.
- 1.1.4** History of the race: There had been no fatalities in this race in the 100+ years of its running, since 1907. Although there have been incidents of vessels lost and casualties in other races in the Gulf of the Farallones, none occurred during the Full Crew Farallones Race and none resulted in vessels or crew being swept onto the islands.⁹

1.2 Vessel Information – The affected vessel, Low Speed Chase, was a Sydney 38, built by Sydney Yachts, Australia, sail number 38009, owned by James (Jay) Bradford of the San Francisco Yacht Club. It was in good condition and had completed many off-shore races. It had been recently re-furbished professionally in anticipation of entering the Pacific Cup race to Hawaii in the summer of 2012.¹⁰ This design has a stability index of 119-120 according to US Sailing standard records for Sydney 38s. (see [Appendix B](#))

During the race, the vessel had the following gear on board: one fixed VHF radio, two hand-held VHF's (one working and used to check in, one reportedly needing charging); one ACR RapidFix 406 EPIRB; two GPS units, including a Garmin GPSmap 76 handheld belonging to Cahill, the paid skipper, and a Raymarine Chart plotter, model RC520 Plus. The chartplotter was installed in the port-side navigation station. There were multiple life jackets on board to meet USCG and race requirements, but each crew member wore his/her own during the race, except Morrissey, who wore one belonging to the boat. Jacklines were deployed as required by the racing rules.

- 1.3 Vessel Crew Experience and Role** – Bradford, 41, owner; Cahill, 36, paid skipper; Vos, 26, bow; Chong, 38, main trimmer; Kasanin, 46, mast; Fromm, 25, jib trimmer; Morrissey, 32, crew; Busch, 26, crew. The eight crew members were all experienced sailors, most with multiple ocean race experience. Morrissey had the least sailing experience and this may have been his first ocean race. Of the remaining crew, six (all but Chong and Morrissey) had sailed on Low Speed Chase many times before. (See [Appendix C](#) for crew details.)
- 1.4 Management style** – The owner hired a paid skipper, Cahill, to run the vessel and make all course and sail selection decisions. The owner acted as a participating member of the crew, but relied heavily on the greater experience of the rest of the crew.
- 1.5 Weather, Current, and Tide Conditions** – The weather forecast for Point Arena to Pigeon Point 10 to 60 NM offshore (including the Farallon Islands) for the day of the race was “NW winds 15 to 25 kts, wind waves 3 to 7 feet, NW swell 12 to 15 feet at 13 seconds”. This forecast was issued at 08:25 and was unchanged from the Saturday forecast issued the previous day. Wave heights are measured as “Significant Wave Height”, the average of the largest one-third of all waves. With a forecast for swells up to 15 feet, a maximum wave height of 30 feet would be expected, and 1% of waves (two or three per hour) would be expected to average 25 feet in height. The forecast wind waves would add two or three feet to the maximum wave. (See [Appendix D](#))

The tide was ebbing at the start of the race, which caused Low Speed Chase to be set beyond the starting line and have to anchor. Low tide at SE Farallon Island on April 14 was 0.1 feet at 13:02. The following high tide was 4.7 feet at 19:48. At 14:36 (the time of the capsizing) the tide height at the Farallones would have been approximately +0.7 feet.

There were two weather buoys which provided useful information for this analysis. Buoy 46026 is a weather buoy located 8 nm ENE of the Farallones. This buoy was reporting winds of 20 knots gusting to 25 knots at the time of the capsizing, eased about 5 knots from earlier in the day. Significant wave height between 14:00 and 16:00 was reported at 10 feet with a period of 14 seconds. This buoy is sheltered from some waves by Point Reyes, and a better indication of deep-water wave height at the Farallones was Waverider buoy 46214 located about 20 miles west of Pt. Reyes and 25 miles NW of the Farallones, at the edge of the continental shelf. This buoy was reporting a significant wave height of 14.1 feet at 14.3 seconds around the time of the capsizing (allowing for wave velocity, see Appendix D). These reports are consistent with conditions reported by the LSC survivors and other accounts.¹¹

Deep-water waves will increase in height and begin to break as they reach shallow water. The “breaking depth” for a given wave will depend on the height and length (period) of the wave, and the shape of the bottom. For an average bottom profile (1:20 slope) and a 14-second period (1000 foot wave length), the average of the largest 1% of the waves will be 23 feet in height, and will break in depths of 30 feet (5 fathoms), see Appendix D. These will be “plunging” breakers, waves which grow to 31’, become vertical, curl, and then collapse into the preceding trough.

The northwest corner of Maintop Island has a rocky ledge extending northwards about 200 yards from shore, marked on the chart by a dotted line and the legend “Breakers”, and breaks continuously. A shoal extends beyond this another 275 yards northwards to the 6-fathom curve, with charted depths of 4₃ fathoms (the nautical convention for 4 fathoms, plus 3 feet, for a total of 27 feet). Beyond this 4-fathom shoal the depth increases to 15-17 fathoms with a slope of approximately 1:20. Tide height (0.7 feet) must be added to the charted depths, so the depth over the shoal would be 28 feet. With a 14 foot significant wave height, approximately 1% of the waves (a few per hour) will break on a shoal at that depth.

The capsizing happened on the 4-fathom shoal, just inshore of a 4₃ sounding (28 foot depth with tide). Based on the forecast, waves at that location would be expected to occasionally reach 30 feet and waves of this height will certainly break in 28-foot depths (the usual rule-of-thumb for breaking depth is 1.3x the wave height). The likelihood of encountering a breaking wave decreases rapidly with small increases in water depth.

1.6 Events of Low Speed Chase during the 2012 Full Crew Farallones Race

1.6.1 Start: Prior to her start, Low Speed Chase, checked in with the race committee of the Full Crew Farallones Race over a handheld VHF, stating “Sydney 38 Low Speed Chase 38009 checking in. Eight souls aboard.”¹² The race committee acknowledged the check-in without noticing that the boat’s pre-race information form listed only seven crew, rather than eight. The survivors stated there were no safety talks or discussion of safety harness use prior to their start; however all crew donned some form of life jacket as required by the rules. The class start for Low Speed Chase was at 09:45. The crew of Low Speed Chase had checked the forecast for the day and expected 25 knots of wind from the northwest and 12-15 foot seas. They led a reef line in the main, but would never need to use it. Due to light wind and ebb tide, the boat was swept the wrong side of the start line. The crew anchored to wait for sufficient wind to return for a proper start. They were more than an hour late for their start. The survivors stated that their objective for the race then changed from attempting to finish first to just avoiding finishing last. Survivors said that they were not trying to take chances to win. (See [Appendix E](#) for survivor’s accounts of the incident.)

1.6.2 Gulf of Farallones: As Low Speed Chase passed under the Golden Gate Bridge and approached Point Bonita, the wind increased and they changed headsails, from the #2 down to the #4 jib. The crew was comfortable with the full main and small jib for the 20-23 knot conditions. They were able to hold starboard tack all the way to the northeast corner of the islands for their planned rounding, leaving the islands to port, although Vos stated they had to pinch at the end to clear the point. The wind and swells were as forecasted and the crew all wore foul weather gear jackets and some form of life jacket, as required. Five of the eight wore life jackets with integrated harnesses. One or two had tethers with them, but none ever clipped in. They were relaxed and discussing which of their three spinnakers they would set on the way back from the islands. Five of the crew took turns driving, but more than half the time Cahill, the professional skipper, drove. He had set a waypoint in his handheld GPS just southeast of the NE corner of the island (North Ledge), which would show them the direction toward the island in low visibility, but it was not a safe point to cross. Bradford had turned on the on-board chart plotter at the start of the race. At some point on the long sail out to the island, Cahill went below, but it is unknown whether he checked their route on the chart plotter.

1.6.3 Approach to Maintop's 4-Fathom Shoal: As the boat approached the island, the wind and seas increased with more white caps appearing. Cahill, the best driver, resumed his place at the helm, with Chong trimming the main. There were a few nearby boats on a track similar to that of Low Speed Chase as they rounded the first point (North Ledge), which dropped fairly steeply to 10 fathoms. After the first point, there is a shallow bight (Maintop Bay) carving to the second point, the 4-fathom shoal at the northwest corner of Maintop Island, before the island turns sharply to the south. At North Ledge, while most of the race boats held a course of approximately 240° to carry them outside the 4-fathom shoal and to a minimum depth of approximately 40-60 feet, Low Speed Chase bore away to a course of 235° and followed a track to a depth of approximately 28 feet.

Chong remembers easing the main and Fromm briefly going to leeward to ease the jib for the new course. The rest of the crew sat on the rail in this order: Kasanin forward, then Vos, Busch, Bradford, Fromm, Morrissey, Chong trimming main, and Cahill driving. Vos, who was doing foredeck, said he was thinking about what gear would be needed for the spinnaker set or winging out the jib after they rounded. Chong focused on the distance of their course from the breakers to leeward and calculated they were about ten boat lengths (128 yards) outside the breakers. No one on the boat commented about their course. As they approached the 4-fathom shoal, a larger than normal wave, the largest they had seen that day so far, crested near them, but they passed it just before it broke, causing comment, but not enough concern to alter their course.

1.6.4 The Wave: A short time later, over the shoal, an even larger swell approached. As Cahill turned the boat to starboard into the wave, the wave started to "face up", and Chong, a long-time friend of Cahill's, later said for the first time ever Cahill sounded scared. As the boat headed up to vertical, the band of white water above broke over the bow, causing the boat to surf backwards down the face of the wave and rotate to port (counter-clockwise) until it was beam-on to the wave and headed on the original course. The wave rolled the boat (Vos estimated to 120-130°), snapped the mast in two, and washed all but Vos and Chong into the water. Vos had one leg wrapped around a stanchion and Chong had wrapped an arm around the lifeline, grasping his opposite wrist. When the 3-to-4 feet of water on deck cleared, Vos saw Busch floating ten feet astern. He and Chong saw Cahill and Fromm overboard, holding on to the port lifelines, and went to leeward to try to pull them back aboard. As they had their backs to the waves, struggling with Cahill and Fromm, a second wave hit. Cahill and Fromm were separated from the boat and

Chong was washed into the water. Vos doesn't know how he stayed on board. Only Cahill was visible to him, 10-15 feet astern. Vos tried to throw him a line, but Cahill disappeared.

1.6.5 **Onto the Rocks:** Vos was the only one left on the boat and was thrown around the cockpit and back against the wheel, as the boat was swept ashore. Finally the boat stopped on a rocky out-cropping, still subject to severe wave action. According to the GPS track, it took only 1 ½ minutes from the capsize to grounding on the rocks. Vos immediately tried to place a distress call on the fixed VHF, but then remembered it would not work without the masthead antenna. The boat continued to be rocked violently by waves, and Vos jumped down onto the rocks. He saw Busch and Cahill in the water to the east¹³ and ran along the shore, through hundreds of sea lions, blowing his whistle to make a path and attract attention. He saw Cahill struggling in the water, but unable to get to shore and he was washed away. Busch had disappeared.

1.6.6 **Survivors on Shore:** Further along the shore, Vos saw Chong kneeling on the rocks 200 yards east of the boat, half in, half out of the water. Vos shouted to Chong to climb higher, out of the waves. With difficulty, Chong crawled up to join Vos. They walked together another 200 yards east and found Bradford at the bottom of a cliff, safe on a low ledge. Kasanin had been close to him as they both washed ashore, but Kasanin did not make it to the ledge and was floating face-down out of reach at the bottom of another eight-foot cliff with his inflated life jacket/harness up around his head. The other crew members, Morrissey and Fromm, were never seen again. (See [Appendix E Locations](#)) Chong began to feel hypothermic, so Vos gave him the red jacket he had spread out for visibility.

Vos saw boats off-shore and went back to Low Speed Chase for the handheld VHF's and flares to alert them. He timed the waves to jump on the rolling boat and climbed to the cabin top to try calling on the two handheld VHF's, but got no response. When the boat was jarred by another wave, Vos was knocked off the boat and as he grabbed for a handhold the VHF's and one bag of flares fell into the water and were lost. He held on to the other bag of flares and set some off on a high point of the island. He then ran to the west side of the island to look for the remaining crew. Seeing no one, he returned to Chong and Bradford. He reported he was heartened to see several race boats off Maintop Bay, heading in both directions, which he interpreted (incorrectly) to mean the boats were standing by to help. He believed the Coast Guard would be there soon.

1.6.7 **Witnesses:** The crews of at least seven other race boats witnessed the initial capsize and/or saw the boat on the rocks and called the Coast Guard on VHF channel 16 or the race committee on VHF channel 69. Due to poor radio protocol, there was initial confusion about which boat, or how many boats, were in trouble. Due to inaccurate race committee crew records (see 1.1.2 and 1.6.1), there was confusion about how many crew were on board Low Speed Chase. There were problems with overlapping transmissions and an apparently-stuck microphone. Of the seven other race boat crews interviewed who witnessed the incident, all deemed the conditions too dangerous to physically stand by and attempt to render assistance. All continued racing.

1.6.8 **EPIRB:** Low Speed Chase's EPIRB apparently self-activated when it was submerged down below in the boat and transmitted for some time before turning itself off when no longer submerged. The initial position was four miles off since the unit was not a GPS-enabled EPIRB. The position did not resolve until another satellite pass, which took 40 minutes, but that did not slow down or affect the search and rescue activities. (See [Appendix F EPIRB.](#))

1.7 Emergency response – The first call the Coast Guard received on channel 16 was unclear regarding which boat was calling and which was in trouble.

At 14:39, Coast Guard San Francisco received reports on VHF channel 16 of a white vessel with white sails on the rocks on Southeast Farallon Island. The Coast Guard immediately diverted one of their HH-65 helicopters, which was too low on fuel for the mission so had to land to re-fuel. The Coast Guard also launched the cutter, CGC Sockeye, and a 47 foot Motor Life Boat from Station Golden Gate, and broadcast a notice to mariners.

At 14:51, Green Buffalo transmitted a Sécurité message saying they had seen a vessel on the rocks in high surf with no people visible.

At 14:57, Farallon Fish and Wildlife reported two people on shore and one flare launched.

At 15:20, the Coast Guard received notice of an EPIRB signal and identified it as being from Low Speed Chase through the race committee records. The signal had taken 40 minutes to be “heard” by LEO (Low Earth Orbiting) satellites.

At 15:21, the Coast Guard helicopter was ready to launch. The Coast Guard requested additional help from Air National Guard 129th, which launched two HH-60G Pave Hawk helicopters with four Guardian Angel Pararescuemen located in the Moffett Federal Airfield in Mountain View.

At 15:36, Farallon Fish and Game reported three people on shore. The Coast Guard helicopter was on scene with the CG cutter Sockeye 45 minutes away.

By 15:59, the Coast Guard helicopter was lowering a swimmer and ascertained from the survivors the number of crew and known disposition. The Coast Guard helicopter hoisted Chong and Vos with the helo’s basket, in spite of the difficulty with turbulent conditions, which required several attempts and a hoist from a higher than normal altitude.

The 129th Air National Guard accomplished the complicated rescue of Bradford, who was trapped on the rocky ledge, and the recovery from the water of Kasanin’s body, which required a rescue swimmer to descend to the ledge to attach harnesses.

For the next 30+ hours, extending beyond any chance of survivability, the Coast Guard and the 129th Air National Guard set multiple search and rescue patterns over a 15- by 30-mile area, employing the most search and rescue assets ever used locally: three cutters, a 47-ft motor lifeboat, at least three helicopters and at least one C-130 aircraft.

Captain Stowe personally notified the families of the missing just before abandoning the search. (See [Appendix F](#) for full timeline of CG actions.)

The San Francisco Police Department conducted an examination of the incident and determined there was no criminal act committed which resulted in the accident.

1.8 Injuries/Survival Opportunities – Three crew members, Bradford, Vos, and Chong, survived with minor injuries. All seven crew who were swept off the vessel into the 51°F water were subjected to cold water shock. The two survivors, Bradford and Chong, described their struggle to avoid drowning, and that description is entirely consistent with cold water shock - defined as the body’s initial response to sudden cold water immersion. These include reflex gasping, uncontrolled rapid breathing and inability to breath-hold. Stress on the heart can also be profound and life-threatening; heart rate and rhythm changes frequently occur, reducing blood supply to the brain, followed by confusion, disorientation, or sudden loss of consciousness.

Although it is unknown to what extent cold water shock and progressive hypothermia impaired the other crew in the water, it can be reasonably surmised from the survivors' interviews and the medical examiner reports that cold water shock ultimately played a major role in their deaths.¹⁴ As of the date of this report, three bodies had been recovered from SE Farallon Island: Marc Kasanin on 14 April 2012, Jordan Fromm on 26 April 2012, and Elmer Morrissey on 2 May 2012. These three individuals were found to have drowned.

The remaining two crew members, Alan Cahill and Alexis Busch were still missing and presumed drowned. (See [Appendix G](#) for details)

- 1.8.1** Life Jacket use: All crew members met the life jacket minimum requirements stated in the Ocean Yacht Racing Association prescriptions for this race. However, that requirement stated only that: “adequate floatation devices will be worn at all times while on deck” rather than specifying the type of personal flotation that Category 2 requires each vessel to have: “a USCG approved Type I non-inflatable personal flotation device (PFD), or a USCG approved yoke-type inflatable with 33lb (150N) or greater buoyancy.” Several of those drowned wore non-conforming life jackets with less buoyancy or which, in the case of the belt pack,¹⁵ required secondary donning. The two survivors who entered the water had automatically inflating integral life jacket/harnesses, which met the US Sailing requirements. However, these survivors reported struggling with their inflatables riding high about their heads in the water, making it difficult to breathe and nearly impossible to use their arms for propulsion since they were battling the inflated bladders. One survivor, Chong, said he never would have been able to pull a manual cord to initiate inflation since he was completely occupied with trying to breathe and battling his life jacket. One casualty, Cahill, was wearing a belt pack, which required manual activation to inflate. The survivors reported that when they saw Cahill in the water, his life jacket was not inflated. One other casualty, Fromm, was wearing a foam vest of undetermined buoyancy.¹⁶ (See [Appendix C](#))
- 1.8.2** Tether use: Tethers were not used by any crew members. Although the jacklines were deployed, no one clipped in to any part of the boat. All but two crew members, Cahill and Fromm, wore harnesses, but only one, Chong, carried a tether on his body. There were extra tethers on board, some stored in a sheet bag in the cockpit. The one person who remained on board survived while five out of seven of those washed overboard died.
- 1.9 Damage to vessel** – The vessel survived the grounding. The mast was broken between the first and second spreaders, but not completely torn away. Survivors’ accounts indicate the boat did not roll completely over, although the mast tip could have easily hit the bottom in the partial capsize. Photos of the vessel after its grounding show the rudder broken, but still attached, the keel substantially unharmed and the starboard side unscathed. There were a few holes on the port side where the hull ground against the rocks, but in general the hull remained intact. (See [Appendix H](#) for details)
- 1.10 Race Communications Issues** – There were difficulties in communications between race boats, race committee, and the Coast Guard, but this did not slow the search and rescue response.
- 1.10.1** VHF communications between the race committee at St. Francis Yacht Club and competitors near the Farallones were virtually impossible due to distance and terrain-related VHF limitations, which led to some confusion within the race committee about the specifics of the incident and which and how many boats were involved. The race committee therefore passed on erroneous and incomplete information to the Coast Guard during the initial stages of their search and rescue effort.
- 1.10.2** Race committee “accountability” information, i.e. knowing how many and which participants were still on the course, appears to have been incomplete or uncertain at some points during the race due to communications difficulties.
- 1.10.3** Communication between the race committee and the Coast Guard Command Center was interrupted for several hours during the incident as a result of misunderstanding as to who was the responsible race committee point of contact. The PRO was properly listed on the paperwork as the race committee point of contact. However, the Coast Guard received a call from an individual with close ties to the crew-members, volunteering to be the point of contact for their families, and the Coast Guard thought that the

caller intended to replace the PRO as the point of contact for the race committee. It took several hours to resolve the misunderstanding.

- 1.10.4** Communication Protocol: The Coast Guard Command Center indicated that competitor VHF communications in reporting the incident were sometimes difficult to understand due to incomplete descriptions and overlapping transmissions. At least one “open mike” problem was encountered. The Coast Guard has noted that there is a prescribed procedure for calling in emergency reports on VHF 16. (See [Appendix I PIW](#).) Although transmission difficulties created confusion for the Coast Guard in identifying which boat was in trouble, how many boats were possibly involved, and how many people were in jeopardy, this confusion did not delay their initial action or compromise the search and rescue operation. (See [Appendix I](#) for a full report on race communications details.)
- 1.11** **Course selection of other race boats (tracks)** – The panel compared the GPS track of Low Speed Chase to others in this race. One other track crossed the shoal at the same place as that of Low Speed Chase approximately eleven minutes later. The boat sailing that track was similarly at risk. Of the 14 tracks available to the panel from the 2012 race, four additional tracks crossed between the six fathom and ten fathom lines, one just clipping the six fathom curve, and the other 8 tracks were all on or outside the 10-fathom (60 ft) curve. Another dozen tracks were made available from previous Farallones races from 2009 to 2011. All were outside the two inshore tracks mentioned above except one: the Low Speed Chase track of 2011. (See [Appendix J](#))
- 1.12** **Response from other racers** – US Sailing sent a 50-item questionnaire to all skippers of the 2012 Full Crew Farallones race and received thirty replies, which helped the panel understand the racing fleet’s preparation for ocean racing and commitment to maintain safe practices. The panel personally interviewed the three survivors as well as fourteen other racers and gained valuable insight from their comments. The panel appreciates their time and willingness to share thoughts on a difficult topic. (See [Appendix K](#) for complete questionnaire response and interview summaries.)
- 1.12.1** Questionnaires: Of the thirty respondents, most were experienced: all but one had sailed the race before and all but four had sailed multiple times. None was surprised by the weather and all found the forecast accurately predicted the actual wind and wave conditions. The strongest winds reported ranged from 20 to 30 knots; the highest waves experienced ranged from 8 to 16 feet. When asked who determined the distance off shore in rounding the islands, 24 reported the skipper and 6 reported the navigator. Half the boats reported some level of seasickness or fatigue during the race. 24 boats stated they had a crew safety briefing before the start and all but one checked their safety equipment. All crews donned lifejackets before the start and crews of 18 boats also donned harnesses before the start. Another nine boats donned harnesses sometime outside the Bay, but three boats reported the crews never wore harnesses. On five boats, jacklines were not deployed, contrary to the racing rules. Nineteen boats reported that at least some of the crew were tethered to jacklines during the race, while on eleven boats none did. There was one false inflation of a life jacket while sitting on the rail. One boat reported they had no tether attachments on their life jackets. 21 boats monitored VHF channel 16, which was advised but not required. 22 boats heard the radio traffic concerning the LSC incident and five respondents saw Low Speed Chase on the shore, while one actually saw the capsize. Two boats reported being briefly out of control, both on the way back from the islands.

All respondents said their boats were properly equipped to ISAF/US Sailing Category 2 requirements, although it was clear from other answers that not all were. When asked if the Category 2 regulations were sufficient, all but two answered yes. When asked if the Category 2 regulations were burdensome, four of the 30 said yes. Finally, the respondents were asked: What information could be

made available to sailors to help them prepare for a similar event (say, at a seminar)? The complete responses to this question are in the appendix, but the majority mentioned more training in the likely occurrence of breaking waves in the shoal waters around the islands, and more stringent use of personal safety gear including proper life jackets and tethers. Several suggested specifying a minimum distance or a virtual waypoint off Maintop Island.

1.12.2 Interviews: the panel interviewed seventeen Farallones racers from eleven different boats, including the three survivors. The information gleaned from these interviews included specific answers to questions on the following topics: prior crew experience and Safety-at-Sea training; command structure; life jacket and harness wear; jackline and tether use; understanding of weather and sea state; considerations of withdrawing at any point in the race; strategy for rounding the islands; status of the boat when rounding (sail compliment, reefs); any crew overboard or serious injuries; other safety gear employed; attempts, if any, to provide assistance to Low Speed Chase (alter course?, delay racing?); quality of communications monitoring, transmission, and reception. Finally, we asked what the interviewee would have done differently and solicited recommendations for future races. The results of the interviews appear in [Appendix K](#).

We interviewed crew from ten boats other than Low Speed Chase sailing in this race. Of those, all had prior ocean racing experience, but only five boats had crew aboard who had taken a Safety-at-Sea seminar. None, other than Low Speed Chase, had any paid crew. Six of the ten boats had a tactician in addition to the skipper. All wore lifejackets of some description, which is mandated by the Sailing Instructions. Two of the ten boats did not have jacklines rigged, contrary to the race requirements. Of those with jacklines rigged, only three had the majority of crew tethered, while three others had one or several crew clipped in at some point during the race. All crews checked the weather forecast before the race, and experienced actual wind and wave height similar to what they expected. In some cases the waves were “lumpier” or more confused than expected, but not significantly higher. Only one of the crew on the boats we interviewed considered dropping out and that was due to gear failure and seasickness. Several stated they were much more cautious after viewing the Low Speed Chase capsized. While several of the boats had waypoints entered, none used that to determine their rounding strategy. Whether it was the captain, the tactician, or in one instance a “committee”, who decided the rounding strategy, all considered their visual distance from shore or the surf line, rather than depth, in deciding their course. Most of the boats gauged their distance against the surf line, as did the crew of Low Speed Chase. Only one boat reported checking the depth as they were rounding Maintop Island. It was 45 to 60 feet, which they later judged was too shallow. Several boats decided their course by comparing their position with other nearby boats. One stated they were closer than others, in fact they sailed over the exact spot where Low Speed Chase had been capsized eleven minutes earlier. This very experienced skipper was shaken to learn the risk he had taken with his course.

All the boats interviewed said they were monitoring VHF channel 16, the hailing/distress channel, and channel 69, the race channel. Crews from five of the boats interviewed tried to contact the Coast Guard with information about the capsized, but only three were able to hear a confirmation that their call was received. Although most could hear calls from other boats, none heard calls from the race committee. Several reported problems with overlapping transmissions and interference from an open mike. Although all the boats reported either seeing or hearing of the capsized, and five attempted to provide assistance by sending a distress call to the Coast Guard, no boats delayed or dropped out of racing to stand by physically in order to provide further assistance. None reported seeing any of the flares set on shore or any floating safety gear.

2.0 Analysis:

Low Speed Chase sailed a course which took them across a known shoal area at near-low tide over which the forecast waves could break several times per hour. They encountered a breaking wave which capsized the boat. Although a situation like this can become dangerous very quickly, it is worth considering some options, which may have either avoided or minimized the outcome. Simply staying in deeper water was one option; another was taking action at the first sign of trouble, such as tacking away at the first breaking wave. Although the panel has no way of knowing whether tacking at the last minute would have avoided the capsizing, staying in deeper water most likely would. The panel concludes there is a need for more education in how waves interact with shoal areas and the risks of sailing through these areas. However, even with the best training humans make mistakes. So, while it is certainly necessary to train, one also must be prepared for times when mistakes are made, and have the tools to then maximize the chances of recovery. In this case, those would be first tethers to stay on the boat, then life jackets to survive in the water, and then proper communications to facilitate prompt rescue. Additionally, in this instance, there are improvements to be made in race management.

This report addresses the following four safety issues:

- 2.1 Failure of seamanship in negotiating shoal waters on a lee shore;
- 2.2 Inadequate personal safety gear for offshore conditions;
- 2.3 Limited communication infrastructure hampering race committee-to-race boat communications;
- 2.4 Race management protocol flaws creating uncertainty surrounding search and rescue efforts.

2.1 Failure of seamanship in negotiating shoal waters on a lee shore – Although the crew was experienced in offshore racing and was captained by a paid professional, a course selection was made which led to sailing an unsafe course through the shoal area on the weather side of SE Farallon Island. The panel does not believe that this course was selected with an understanding of the associated risks. The course was not questioned by the crew, even when it was noted that the boat was close to breaking waves. It's not known whether the skipper considered tacking when the first swell passed, nor if that would have prevented the capsizing. Another boat also participating in the race passed SE Farallon Island on a course very similar to that taken by Low Speed Chase, indicating that at least one other skipper took a similar risk. The waves that were reported, and which capsized Low Speed Chase, were consistent with the forecast and were likely to have occurred several times per hour.

The panel considered recommending placement of an offset mark or that the race committee set a course outside the 4-fathom shoal. However, we rejected these recommendations on two grounds: 1) it places an unacceptable burden of responsibility on the race committee to declare a specific distance off-shore safe when under certain circumstances a similar result could occur and 2) in any off-shore race, there are many similar shoal areas and points, which would have similar conditions and similar dangers. It is impossible to set rounding distances at every dangerous point. Sailors must be trained to the standards of seamanship to avoid such dangers. (See [Appendix J](#).)

Decision-making regarding the course selection made by individual sailors participating in a race is an important aspect of the strategy central to the attraction of the sport. The panel believes that these decisions could be better balanced against potential risks if sailors were more aware of the likelihood of encountering breaking waves while traversing a shoal area. While there are no guarantees of absolute safety, risk levels can be greatly reduced by prudent seamanship.

Low Speed Chase had tools on board that would have readily shown depths: a depth sounder, a hand-held GPS, and a chart plotter. The B&G instrument system could have quickly shown the depth if it wasn't already displayed. The hand-held GPS was carried in a cockpit sheet bag, but the survivors do not recall it being consulted near the islands. The chart plotter was located in the port settee area and not easily visible from the cockpit. When the chart plotter was retrieved from the boat, it displayed the last use-state at a zoom level of the entire course, which did not show depths along the boat's track at the islands. (See [Appendix B.](#))

There were several racers in the vicinity of the capsized who tried to radio the incident to the Coast Guard, but the Coast Guard reported problems understanding those communications. This was partially due to lack of adherence to prescribed radio discipline and partially to faulty VHF equipment on the race boats. Information provided from the race boats was misunderstood and impossible to verify, which led to confusion. During several lengthy periods shortly following the incident, communications on VHF 16 were blocked by an apparent "open mike". Once the skipper diagnosed that his remote cockpit mike had shorted out, he disconnected the mike and the system resumed working properly. Although these communication issues did not slow the search and rescue operations or change the outcome in this event, they could have an impact in future situations.

The panel's primary recommendation, based on the findings of this investigation is:

The San Francisco Yacht Racing Association and the NorCal Offshore Racing Council¹⁷ should offer yearly seminars that include training specifically related to breaking wave development in shoal waters and how to calculate reasonably safe water depth for given forecast wave heights. These groups should also publish and make available reference information on this subject.

US Sailing's Safety at Sea seminars and the ISAF Offshore Special Regulations Section 6 – Training should include topics specifically related to breaking wave development in shoal waters and how to calculate the minimum safe water depth.

The San Francisco Yacht Racing Association and the NorCal Offshore Racing Council should remove their prescription under 6.04.1 stating that "Safety At Sea training is strongly recommended" and leave intact the US Sailing Category 2 requirement for such training, which also includes training in radio protocol for communicating distress events and avoiding equipment problems.

Even though several boats provided assistance through VHF communications, the panel found it troubling that no boats appear to have dropped out or delayed their race in order to render assistance, which is a basic tenet of the sea, as well as the first Fundamental Rule¹⁸ of the Racing Rules of Sailing under which the event was sailed. Although it is unlikely that the outcome would have been changed in this case, there were many ways other boats might have provided aid by signaling with those on shore, searching for those in the water, or providing continuing relays for radio communication. This topic is required in the standard US Sailing Safety At Sea seminars recommended above.

2.2 Inadequate safety gear for offshore conditions – Although improvements in personal safety gear would not have prevented the incident, the panel feels they may have mitigated the outcome and there are lessons that can be learned from the equipment in use. The Ocean Yacht Racing Association-modified Minimum Equipment Requirements for the Full Crew Farallones Race required that "adequate flotation devices will be worn at all times while on deck," leaving it up to the individual crew members or boat captain to determine what defined "adequate" flotation. One of the crew of Low Speed Chase wore a belt pack, which does not meet the Category 2

requirements for personal flotation. It was not inflated after the crew was ejected from the boat into the water. At least one other crew wore what appears to be a Type III sailing vest. There is an unfortunate inconsistency in the wording of the requirements: the racers are required to “have” lifejackets compliant with US Sailing 5.0.1 requirements, but not required to wear them. While not a statistically significant observation, of the crew who were thrown into the water, those who survived were in fact wearing life jackets that complied with 5.0.1.

One crew was seen floating in the water with his inflatable up around his head. Although the panel was not able to determine whether this individual might have survived if his life jacket had thigh/crotch straps, both immersed survivors reported that thigh/crotch straps would have increased their maneuverability in the water, and it is the panel’s opinion that the riding up of the PFD/harness combination can be a survival issue. One of the immersed survivors, Chong, stated that if his life jacket had not self-inflated, it would have been impossible to find and pull the manually-activated inflation device, but some experienced sailors have stated there are times when an automatically-inflating life jacket would be a hazard. For these reason, the panel recommends:

The Ocean Yacht Racing Association should change the wording of its current Minimum Equipment Requirement 5.0.1.4 prescription to: 'OYRA prescribes that the personal flotation *required by US Sailing's prescription to 5.0.1* will be worn at all times while on deck.' In addition, the panel recommends that such life jackets be fitted with usable thigh/crotch straps.

The one crew member who stayed on the boat survived and the two survivors in the water stated they would have been more likely to survive if they had remained on the boat. It is already a requirement of Category 2 races that jacklines be run on deck, and Low Speed Chase met that requirement. The requirement does not specify when the crew should be tethered to jacklines or other fixed points and there are opposing opinions regarding tether usage in this situation, but attention is directed to the recommendation by the US Sailing Prescription under 5.02.4 that tethers “be employed whenever conditions warrant, and always in rough weather, on cold water, or at night, or under conditions of reduced visibility or when sailing short-handed.”¹⁹ Although this panel believes tether usage is sufficiently incident-related that it should not be mandated, we recommend that:

Seminars conducted by US Sailing, San Francisco Yacht Racing Association, and NorCal Offshore Racing Council should include training in the rigging of jacklines and a discussion of conditions when tether use is recommended.

In summary, there are four things which might have helped the survival rate: staying with the boat, higher buoyancy life jackets, water-activated inflation, and thigh straps. These changes could have improved the survival chances of those who died.

It has become apparent through questionnaire and interview responses with other racers, that there were several boats racing not in compliance with the prescribed minimum equipment requirements. It is not clear whether these skippers were unaware of the requirements or simply ignored them. One way to insure all skippers are aware of equipment requirements would be to include a mandatory check list, completed and signed by the skipper, as a requirement for entry. For this race no equipment inspections were performed, either before or after the race. The panel recommends:

The Organizing Authority should perform either spot or entire fleet inspections of boats, either pre- or post-race, to ensure compliance with all minimum equipment requirements and impose appropriate penalties for non-compliance.

2.3 Communication Issues – The panel noted that there was a significant problem with communications between race boats and the race committee. Over much of the race course, there was no means for race boats to communicate with the race committee over VHF channel 69, the race channel. Experienced offshore race officers have indicated that this has always been a problem when running offshore races from the St. Francis Yacht Club, due to the topography and the limitations of VHF range. These communication problems delayed the race committee learning of the capsize and grounding and caused some initial confusion as to what boat or boats were involved in the incident. As a result, the race committee was able to provide only very limited assistance to the CG in their response. While the problems with communication did not, in this incident, contribute to the loss of life or the severity of the injuries to the crew of Low Speed Chase, the inability to communicate with the race committee could be a significant factor in the future. To address this problem, the panel recommends:

San Francisco Yacht Racing Association should install and maintain remote-controlled VHF radio stations at appropriate locations (possibly Fort Miley, Drakes Bay, Half Moon Bay) to provide better coverage of the San Francisco Bay Entrance, Gulf of the Farallones, and adjacent coastal areas.

2.4 Race Management Issues – Although it would not have changed the outcome, the management of Northern California offshore races could be improved. The current process for assembling crew and boat information, which is critically important to any Coast Guard search and rescue operation, relies on paper submissions by the skipper, updates by the Yacht Racing Association staff, and last minute updates by the race committee at check-in. This process has weak points which results in gaps and misinformation.²⁰ One of the MEP conditions is for the race committee to maintain 100% “accountability” of all race participants at all times. The race committee currently tracks the fleet by checking off all starters, keeping track of withdrawals and retirements, and checking off finishers. This requires the racers to follow simple rules at check-in, radio-check, and withdrawal, and adhere to proper formats and content of emergency transmissions.²¹ Guidance for this should be communicated in skippers’ meetings and documented in the notices of race with penalties assigned for non-compliance. Race management of offshore races requires additional knowledge and skills beyond that needed for inshore races.²² US Sailing conducts a comprehensive program of training and certification of race officers at several levels, but at present those courses do not address the specific knowledge and skills required to run offshore races.

Approximately seven different organizing authorities currently run offshore races in Northern California with a half-dozen yacht clubs acting as Sponsoring Authorities to supply race committee personnel. Approaches to safety vary considerably between these organizations.²³ The Coast Guard has encouraged these organizing authorities to develop a more consistent approach to all aspects of offshore racing safety. The organizing authorities have recently responded by forming the Northern California Offshore Racing Council (NorCal-ORC).

To address these issues, the panel recommends:

NorCal ORC in association with US Sailing should establish a more accurate and consistent process for recording boat and crew information, to maintain “accountability” of all participants on the race course, including a common web-based entry and record-keeping system and improved protocols for communication between racers and the race committee during check-in and incident reporting. US Sailing should be involved in this development since it has nationwide applicability.

The panel further recommends:

NorCal ORC or SF YRA should implement regular training for offshore PROs and race committee personnel in all aspects of race management, including specific requirements for offshore events, and establish more consistent race management protocols for skippers meetings, equipment requirements, and inspections.

The panel noted that current US Sailing training for PROs does not address conditions specific to offshore events. These conditions include those stated in the Coast Guard Marine Event Permit regarding submission of participant information, communications with the CG and Vessel Traffic Service (VTS), maintaining 100% accountability for all participants, etc. Several of the conditions and requirements associated with the permit were not fully met. The Principal Race Officer and other members of the race committee were not familiar with all of the current conditions and requirements associated with the MEP for offshore races. The panel therefore recommends that:

US Sailing PRO training & certification programs should include specific requirements for offshore events, to address requirements by local Coast Guard and other authorities.

¹ See [Appendix D](#) for a detailed discussion of breaking wave development. There are several rules of thumb for quickly figuring reasonably safe minimum water depths from the maximum forecast swell and wind-wave heights: 1) For the mathematically-inclined, combine swell and wind-wave significant wave heights as the square-root of the sum of the squares, then multiply that by 2.0 to get the largest expected wave, and then multiply that by the 1.3x rule-of-thumb to get minimum water depth, then add some margin in case the waves are larger than forecast; 2) Stan Honey uses a simpler rule for minimum depth, of 2.5x the sum of the maximum forecast swell and wind-wave heights; 3) 'Max Ebb' advises to simply multiply the deep-water significant wave height by 3 (or 4, for some additional margin). For the forecast on April 14th, these calculations would have yielded 1) 43', 2) 55', and 3) 45-60'.

² US SAILING prescribes that Category 2 races are of extended duration along or not far removed from shorelines, where a high degree of self-sufficiency is required of the yachts, but with the reasonable probability that outside assistance would be available for aid in the event of serious emergencies.

³ Per PRO Interview on 13may12: the PRO Began RC work about 20 years ago at GGYC. He was a certified Sr. Race Officer under the old system and is now a certified National Race Officer. He has taught US Sailing race management courses many times and has run many ocean races. This was his tenth Farallones race as PRO, but it had been ten years since he last ran an ocean race before this one. He volunteered to run the race months before the start and does not know why his contact information was added at the last minute.

⁴ Whereas the ISAF OSRs require training for at least 30% of the crew within the prior five years, the OYRA inserts into their Minimum Equipment Requirements a special prescription: OYRA prescribes that Safety @ Sea training is strongly recommended, not required.

⁵ The statement reads: "Each boat entered in a YRA offshore race must meet the OYRA Minimum Equipment Requirements (Found online at www.yra.org/OYRA/ocean_safety.html). By signing below I do hereby certify that I have read, am thoroughly familiar with, and agree to fully comply with the OYRA Minimum Equipment Requirements."

⁶ SFYC race office supplies a physical package to the PRO with permit info, Vessel Traffic Service check-in info, boat check-in sheets, finish sheets, etc. The PRO got this, used it, and relied on it. The YRA PRO package also includes all of the needed race committee forms, including the Marine Event Permit conditions, the Ocean Yacht Racing Association RC procedures document (which includes the requirement to call CG Golden Gate before start, required check-in of number on board, communication log requirements, etc.), and the CG-issued Communications Plan document (which also includes the call CG GG requirement). A separate package includes copies of all of the CBISOC (crew list) forms as submitted to the CG. These last two packages from the YRA were e-mailed to the PRO sometime late in the week of the race. He had them on his computer, and brought the computer to the race committee to have them on hand, but he never printed them out or read them, so he was not aware of the permit requirements beyond the standard (all races) package from the SFYC.

⁷ Per PRO: Radio check-in process was very difficult. All boats wait until the last 20 minutes before the start. Some check in from too great a distance, maybe their home slip. Radio reception is spotty and difficult to understand with a lot of stepped-on transmissions. There are not enough people on race committee to keep track of all. RC duty for Ocean Yacht Racing Association races is known to be tough duty with long hours. Some boats did not check in with the number of crew on board,

as required. Check in forms do not show crew numbers from YRA forms (CBISOC) showing crew list as submitted to CG, so no verification is possible. PRO believes mandatory skippers meeting would help to emphasize check-in discipline.

⁸ Race committee documents for Low Speed Chase showed only seven crew members on board, even though at check-in the boat declared eight. The PRO said that if the crew number from the CBISOC were on the check-in sheets, it would be easy to identify the discrepancies, but fixing it by radio, including names, contact info, etc. would still be very difficult. He believes 5-6 boats probably sailed with discrepancies, due to no shows, dock pick-ups, etc.

⁹ In 1982 a huge storm swept through the Gulf of the Farallones. Four racers in the Double-handed Farallones were lost on their way home from the islands. In 2008, two men died during the Double-handed Lightship race.

¹⁰ Interview with a previous crew who last sailed on the boat in February: "Boat was in disrepair three years ago, but had a lot of professional care in the last year and was in very good shape in February."

¹¹ Crews from other race boats describe waves: Atalanta: Based on the weather forecast the largest waves anticipated were 12 – 15 feet. Once at the island they saw waves of 12-15 feet and winds in the 20s. Ohana: recalls a weather forecast for race day that had 15 to 25 knot winds. His expectations for the largest seas were "big swells, period not bad. . . Up to 14-foot swell and had lumpy expectations." Green Buffalo: there was discussion about confused, reflected waves. . . a repetitive sweeping wave running west to east, which "tugged at the boat 3 – 4 times." There were waves from NW off the point on Maintop Island. Based on the forecast the largest waves anticipated would be 15, or maybe 20 feet would not surprise them. "The seas are always messy near the island, rebounding waves and you can see the big breakers. The two places that get big waves are off the two points and the shoal off Maintop." Temerity (leaving island to starboard): "Seas were 10 – 12 feet. . . At island and then passing seal rock it got "really ugly." Then we saw weird breaking waves at 14:37. We could see big waves off the starboard bow just west of Maintop Island. There had not been waves there before." French Kiss: Based on the forecast the largest waves anticipated were maybe 15 feet. Also some cross swell predicted. Expected wind waves of 2 -4, and with swell a predicted max 16 feet. At the island the seas were rougher than they had seen in previous roundings. The swell was as suggested but the wind waves were bigger, maybe 5-6 feet from the northwest and rapid with a shorter period. MADE Easy: Based on the forecast the largest waves anticipated were 10 to 12 feet. Around the Farallones they were seeing winds of 18 to 22 knots; rounding Maintop they saw gusts to 30 knots. After rounding the first point they were seeing seas of 15 to 18 feet. The waves were steeper, but not a problem. As they followed LSC around the points, they saw breakers between them, one wave that looked to be 18 to 25 feet and was steep. Split Water: expected to see largest waves of 12 to 15 feet. A mile from Farallones the waves kicked up. There were stacked up storm swells on the NW side of the islands. Wind was from 290 – 300. They remember one larger wave near the shoal off Maintop and white water out 3/8 of a mile off of Maintop Point. Redhead: sea state was jumbled but constant on the way out. They were not anticipating anything bad and did not recollect any particularly bad waves at the island, but they were hit by a bad one on the port side on the way home that got people wet. Bradford, LSC: recollects a weather forecast with 12-foot seas and about 20 knots of wind, "and that is exactly what it was. Some sets of waves were bigger, they came and went. At the island it was a little over 20 knots, we never saw 30. At the island we saw 14 foot waves; the wind was moving them around."

¹² The skipper of Low Speed Chase was careful to update the actual number of crew on the boat from the submitted form, which had stated seven crew, since the boat had been disqualified from the 2011 Full Crew Farallones Race for not having a proper boat/crew form on file.

¹³ Nick Vos sent the following correction: I saw Alan and Alexis in the water while I was still on LSC, not while I was on Maintop Island. I went east looking for them as that is the direction they were relative to the boat while I was on the vessel attempting to get them a line.

¹⁴ For more discussion of cold water immersion and hypothermia, see: Chapter 17, Cold Water Immersion, in Medical Aspects of Harsh Environments, Volume 1, by LORENTZ E. WITTMERS, MD, PHD; AND MARGARET V. SAVAGE, PHD; SURVIVAL IN COLD WATERS, by Dr. C. J. Brooks, for Transport Canada, Ottawa, Ontario; and "Drowning", by David Szpilman, M.D., Joost J.L.M. Bierens, M.D., Ph.D., Anthony J. Handley, M.D., and James P. Orlowski, M.D., in "The New England Journal of Medicine", May 31, 2012

¹⁵ Belt Packs are generally 35# buoyancy bladders with 33-38g of CO₂. The vast majority are manually activated. Since before activation they are contained inside a waist pouch and therefore require "secondary donning", they are not recommended for non-swimmers. If you can inflate the bladder, it's not too much more difficult to pull it over your head, but it is additional effort compared to a "yoke style" life jacket.

¹⁶ Fromm's foam vest was a non-conforming Zhik with 11.2# of buoyancy.

¹⁷ The NorCal ORC is a coalition of Northern California Organizing Authorities recently formed in response to the Coast Guard's concerns raised by the Low Speed Chase incident.

¹⁸ Racing Rules of Sailing, Part 1, Rule 1.1: "A boat or competitor shall give all possible help to any person or vessel in danger."

¹⁹ From the US Edition 2012-2013, ISAF Offshore Special Regulations, Including US Sailing Prescriptions

²⁰ In the short run, there are several improvements, particularly in the area of updates, which can be made to this process to ensure greater accuracy. In the longer run, a common web-based system should be developed, examples of which already exist, which will facilitate not only submission and the updating processes, but also provide immediate access to the information by the CG.

²¹ Subject to the current limitations of VHF communications, greater discipline on the part of the racers in VHF use could significantly improve the effectiveness of communications with the RC and with the CG.

²² PROs need to be familiar with MEP conditions, crew/boat information process, “accountability” process, and CG communications requirements. In addition, RC staffing needs for offshore are increased by these processes and requirements.

²³ Variations include equipment requirements and inspections, skippers’ meetings, position reporting, information flow to the CG, and non-compliance penalties.



2012 OYRA Ocean Racing Series

NOTICE OF RACE

Organizing Authority: The YRA of San Francisco Bay
1070 Marina Village Pkwy, Ste 202-G Alameda, CA 94501
415-771-500 ph, 415-276-2378 fx
Info@yra.org email, www.yra.org website

1. RULES

- 1.1. These races will be governed by the Racing Rules of Sailing, 2009-2012 (RRS), the Prescriptions of U.S. Sailing, this Notice of Race, and any Rules modified by the Sailing Instructions for OYRA races.
 - 1.1.1. Between the hours of sunset and sunrise, as recorded in any standard tide & current book for San Francisco Bay, the Steering and Sailing Rules from IRPCAS (International Rules for Prevention of Collisions at Sea, effective 1977) and UIR (the Unified Inland Rules, effective 1981) shall replace Part 2 of the RRS. Preamble to RRS Part 2 still applies. Competitors are advised that non-competing boats are not governed by RRS and that IRPCAS or UIR govern meetings with non-competing boats.
 - 1.1.2. The 2011 – 2012 ISAF Offshore Special Regulations Governing Offshore Racing for Monohulls & Multihulls, prescriptions for Category 2 Racing, as modified by the "OYRA Minimum Equipment List" shall apply.
 - 1.1.3. 406 EPIRBs or PLBs are required to compete in all OYRA Races.
 - 1.1.4. RRS 40 is deleted and replaced with, "all competitors shall wear life jackets or adequate personal buoyancy while on deck." Note that Flag Y will not be displayed.
 - 1.1.5. RRS 41(d) is modified to include the use of cell phones and other internet devices to obtain NOAA weather and buoy information.
 - 1.1.6. RRS 44.2 is not in effect. Penalties shall apply under RRS 44.3 using a penalty of 20% of the number of boats that came to the starting area, but not less than one, nor worse than DNF. This changes RRS 44.3(c)
 - 1.1.7. RRS 52 is modified to allow boats the use of powered winches, powered hydraulics, or powered furling devices as long as those boats have declared this information on their PHRF application. Only those boats that have declared this equipment and have been rated accordingly can sail in this configuration.
 - 1.1.8. RRS 77 is deleted and replaced with "All mainsails and head sails larger than 125% must carry sail numbers identifying the vessel. The number on the mainsail and all headsails must be the same as on the entry form. Spinnakers need not carry sail numbers.
 - 1.1.9. RRS 89.2 (a) is deleted and replaced with "Sailing Instructions, Notice of Race, Minimum Equipment Requirements, Boat/Crew Information and Statement of Compliance Forms, Entry Forms and other related material may be downloaded from the YRA website".

2. ELIGIBILITY

- 2.1. All Mono-hulls with a valid NCPHRF Certificate and Multi-hulls with a valid BAMA Certificate, which are equipped for offshore sailing, including having a 406 EPIRB (or PLB), are invited to compete in the OYRA Series of races to be held on the ocean waters surrounding San Francisco Bay.
 - 2.1.1. Mono-hull boats must have an enclosed cabin, a minimum overall length of twenty feet and a displacement of 2,000 lbs empty. Multi-hull boats shall have weather-tight enclosed accommodations for the crew and shall have the ability to float in an inverted position indefinitely.
 - 2.1.2. All boats must meet the Minimum Equipment Requirements and all standards set forth by the OYRA. Minimum Equipment Requirements can be found on the YRA website.
- 2.2. All OYRA competitors must:
 - 2.2.1. Be members of YRA
 - 2.2.2. Be members of a Yacht Club (YC) belonging to the YRA.

3. REGISTRATION

- 3.1. Eligible boats may enter electronically on the YRA website or request that entry forms be sent from the YRA office. Entry Forms are also available for download on the YRA web site and are printed in the Latitude 38 Master Racing schedule for San Francisco.
- 3.2. Prior to each and every OYRA Race a competitor must submit a Boat/Crew Information sheet. This sheet will include a statement that the vessel has complied with all requirements of the OYRA Minimum Equipment List. Failure to submit a Boat/Crew Information Sheet will result in a boat being scored DNS.

4. FEES

- 4.1. Entry fees and deadlines are outlined on the YRA entry form described in Paragraph 3.1.

5. DIVISIONS

- 5.1. The Following five divisions shall make up the OYRA Fleet:
 - 5.1.1.1. PHRO1A – Boats with a PHRF of 0 (zero) or less
 - 5.1.1.2. PHRO 1 – Boats with a D/W Ratio of less than 200 PHRF less than (TBD)
 - 5.1.1.3. PHRO 2 – Boats with a D/W Ratio of less than 200 PHRF greater than (TBD)
 - 5.1.1.4. PHRO 3 – Boats with a D/W Ratio of 200 or more
 - 5.1.1.5. SHS – Short Handed Sailing, open to any boat single or double handing. Must be specifically requested at time of entry

6. MANAGEMENT

- 6.1. Each race shall be under the management of the race committee of the sponsoring yacht club. The Yacht Club and Race Committee Chairman for each race is listed in the Sailing Instructions for that race.
- 6.2. The OYRA board contact information is listed on the YRA web site

7. SCHEDULE AND RACING AREAS

- 7.1. Dates, venues, and sponsoring yacht clubs are as follows:

Date	Race – Racing Area	Sponsoring Club
3/17	Lightship *	St Francis YC
4/14	Full Crew Farallones *	San Francisco YC
4/28	Duxbury Lightship *	South Beach YC
6/9	Drakes Bay 1 *	Corinthian YC
6/10	Drakes Bay 2 *	Corinthian YC
6/30	One Way to Half Moon Bay	Half Moon Bay YC
7/14	Junior Waterhouse	Richmond YC
8/11	SF Approach Buoy	TBD
9/22	Southern Cross	San Rafael YC

- 7.2. The series shall consist of the nine ocean races described above. The number of races allows a boat to experience diverse weather conditions, night sailing, overnight anchoring and close encounters with marine life.
- 7.3. A boat's worst score shall be excluded from the full series.
- 7.4. To qualify for awards a boat must start 50% of the series races.
- 7.5. The first five races will make up the Pacific Cup Prep Series.
 - 7.5.1. Racers who sign up for the entire OYRA Ocean Series are automatically entered into the Pacific Cup Prep Series. Additional entry is not required.
 - 7.5.2. The OYRA Pacific Cup Prep Series will be a five race series with no throw out.

8. SAILING INSTRUCTIONS

- 8.1. Sailing Instructions will be posted on the YRA web site approximately 2 weeks before the race.
- 8.2. Notices to competitors and changes to the sailing instructions will be posted on the YRA web site.
- 8.3. Entrants may request that sailing instructions be sent by US Mail. This request may accompany their entry or thereafter, but must be in writing and include name, boat name, sail number, and address.

9. COURSES

- 9.1. Courses will be defined in the sailing instructions for each race day.
- 9.2. Courses range from 21 to 58 NM.

10. SCORING

- 10.1. The Low Point Scoring System RRS A4.1 will be used to score finishing boats. RRS 4.2 is modified to state, penalty points will be added to the number of boats that came to the starting area plus one for OCS, DNF, DNS or RAF (prior to protest hearing), plus two for DNC, and plus three for DSQ. A DSQ for Safety violation is considered as a (DNE) in addition to RRS 89.3(b). Ties will be broken in accordance with RRS A7 or A8 as appropriate. RRS A9 is deleted.
- 10.2. The Time-on-Time (TOT) system of scoring shall be used.

11. AWARDS & CHAMPIONSHIPS

- 11.1. Daily trophies will be awarded for each individual OYRA Race
- 11.2. Series Championships will be awarded for OYRA Pacific Cup Prep Series, and overall for the full series.

12. COMMUNICATIONS

- 12.1. RRS 25 is changed to allow for on-the-water radio communication between the Race Committee and racing boats on the VHF channel specified in the Sailing Instructions for that day. The RC may hail OCS and may advise the fleet starting order by loud hailer and/or VHF radio.
- 12.2. Competitors are advised to monitor VHF channel 16 while racing.
- 12.3. Competitors are advised to monitor Vessel Traffic Service on VHF channel 14 (inside the Bay) and 12 (on the ocean), and are encouraged to hail commercial vessels on channel 13 to ascertain their intentions. Information thus obtained about commercial traffic movements shall not be construed as outside assistance under RRS 41.
- 12.4. Participating boats must notify the Race Committee if they are dropping out of the race or will be unable to finish the race within the stated time limit found in the sailing instructions.

13. DISCLAIMER OF LIABILITY

- 13.1. Sailing is an activity that has an inherent risk of damage and injury. Competitors in a YRA event are participating entirely at their own risk. See RRS 4, Decision to Race. The race organizers (organizing authority, race committee, protest committee, host club, sponsors, or any other organization or official) will not be responsible for damage to any boat or other property or the injury to any competitor, including death, sustained as a result of participation in this event. By participating in this event, each competitor agrees to release the race organizers from any and all liability associated with such competitor's participation in this event to the fullest extent permitted by law.

Full Crew Farallones Race – Sailing Instructions – Rev 4/10/12

Sponsored by The San Francisco Yacht Club

1. RULES

- 1.1. This race will be governed by the rules as defined by *The Racing Rules of Sailing 2009 – 2012* and the *YRA Standing Sailing Instructions*, except as any of these are changed by these sailing instructions.
- 1.2. RRS 40 is deleted and replaced with “all competitors shall wear adequate personal buoyancy while on deck”.

2. ENTRIES

- 2.1. This race is open to all qualified yacht owners who are season racers in OYRA, or have paid a one-time entry fee for this YRA event, and have met the minimum equipment requirements for YRA Ocean Races.
- 2.2. Yachts that have not submitted a signed Boat & Crew Information/Statement of Compliance Sheet to the YRA by the deadline will not be considered starters and will be scored DNS.

3. COMMUNICATIONS

- 3.1. **ALL YACHTS MUST CHECK IN ON VHF CHANNEL 69 WITH THE RACE COMMITTEE DURING THE CHECK IN PERIOD 0830 TO 0930.**
- 3.2. Failure of a boat to check in before the deadline and establish two-way communication with the race committee will result in the boat not being considered to have started and will be scored DNS. The Race Committee may make announcements on, and will monitor **Channel 69**, but will not be able to respond to queries in the one minute before and after a start. Vessels in need of *safety assistance* should

hail the Coast Guard on Channel 16 in case of emergency. Boats should monitor VHF 16 at all times.

4. SCHEDULE OF RACE:

Race	Day and Date	Time of Warning Signal & Flag
Farallones	Saturday April 14, 2012	0940 hours First Division Warning

4.1. SCHEDULED STARTING SEQUENCE

FLEET	DIVISION FLAG
PHRO 1/PHRO1 Pac Cup – D-W/L < 199 and PHRF 63 or less	C - CHARLIE
PHRO 2/PHRO2 Pac Cup – D-W/L < 199 and PHRF 66 or greater	D - DELTA
PHRO 3/PHRO3 Pac Cup – D-W/L > 200 all PHRF	E - ECHO
SHS/SHS Pac Cup & Multihulls	F - FOXTROT

5. START

5.1. Between Mark "A" and an orange marker on the St Francis Yacht Club race deck. Cross the line from East to West.

6. COURSE

6.1. From the start, to and around the Southeast Farallones Island leaving same on either port or starboard, then to the finish. Calculated distance 58 nautical miles

7. FINISH

7.1. Same as the starting line except cross the line from West to East.

8. TIME LIMIT

8.1. All boats not finishing by 0800 hours on Sunday April 15, 2012 will be scored DNF.

8.2. Yachts finishing after 2000 hours on Saturday April 14, 2012 if not receiving a response from the RC must take their own time (using GPS time) and report it to the YRA Answering Service at (415) 771-9500. RC will attempt to maintain a watch on the radio for approaching boats & for safety.

9. REPORTING FINISH/WITHDRAWAL/DNF

9.1. Boats finishing during the night will illuminate the boat's sail numbers to assist the RC. In addition, each boat should record her own finish time (using GPS time) and note both the boat ahead and behind, whenever possible.

9.2. Boats not finishing within the time limit or boats not completing the course, unless directly and specifically acknowledged by the RC, must report the fact to the YRA answering service at 415-771-9500. If not able to report while underway, telephone contact must be made immediately after coming ashore. Any boat not so reporting will be scored points equal to a DSQ under YRA SSI 2.0 and is considered a DNE (Disqualification not excludable).

10. CREW INFORMATION SHEET

10.1. A Boat & Crew Information/Statement of Compliance sheet (**ATTACHMENT 1**) MUST be on file with the YRA office **no later than 1700 hrs the Thursday before the start**. Boats that fail to submit their sheets by the Thursday deadline will not be considered entered in the race and will be ineligible to race. Forms must be **faxed** to 415-276-2378 or **emailed** to info@yra.org.

11. PENALTIES

11.1. RRS 44.2 (two-turns penalty) is not in effect. Penalties shall apply under RRS 44.3 using a penalty of 20% of the number of boats that came to the starting area but not less than one or more than DNF.

12. PROTEST

12.1. In accordance with the YRA Standing Sailing Instructions Article 17.0.

13. RELEASE OF LIABILITY

13.1. Sailing is an activity that has an inherent risk of damage and injury. Competitors in this event are participating entirely at their own risk. See RRS 4, Decision to Race. The organizer (organizing authority, race committee, protest committee, host club, sponsors, or any other organization or official) will not be responsible for damage to any boat or other property or the injury to any competitor, including death, sustained

as a result of participation in this event. By participating in this event, each competitor agrees to release the race organizers from any and all liability associated with such competitor's participation in this event to the fullest extent permitted by law.

14. RACE COMMITTEE

14.1. San Francisco YC: 415-435-9133
Anne McCormack

15. INFORMATION

14.1 YRA: (415)771-9500 or e-mail info@yra.org.

ATTACHMENT 1 – CREW/BOAT INFORMATION & STATEMENT OF COMPLIANCE SHEET(CBISOC)

THIS FORM MUST BE FAXED OR EMAILED TO THE YRA OFFICE NO LATER THAN 1700 hrs THE THURSDAY BEFORE THE START. FAILURE TO SUBMIT THE CBISOC SHEET ON TIME WILL CAUSE A BOAT TO BE INELIGIBLE TO RACE. FAX TO 415-276-2378, OR EMAIL TO INFO@YRA.ORG

BOAT NAME: _____ SAIL #: _____

DECK COLOR: _____ HULL COLOR: _____

BOAT TYPE: _____ LOA: _____ DRAFT: _____

MARINA: _____ BERTH: _____

REGISTERING
AUTHORITY: _____

EPIRB TYPE: _____ BEACON ID: _____

OF VHF RADIOS ON BOARD: _____ ON BOARD CELL PHONE # : _____

SKIPPER'S NAME: _____

SKIPPER'S ADDRESS: _____ SKIPPER'S CELL #: _____

SKIPPER'S EMERGENCY CONTACT: _____ CONTACT PHONE: _____

OYRA MINIMUM EQUIPMENT STATEMENT OF COMPLIANCE

Each boat entered in a YRA offshore race must meet the OYRA Minimum Equipment Requirements (Found online at www.yra.org/OYRA/ocean_safety.html). By signing below I do hereby certify that I have read, am thoroughly familiar with, and agree to fully comply with the OYRA Minimum Equipment Requirements.

SKIPPERS SIGNATURE: _____

CREW # 1: _____

Emergency Contact: _____ Contact Phone: _____

NOTE: Each skipper must certify that he/she has read and complies with the Minimum Equipment Requirements for Category 2 races including SF Bay OYRA Prescriptions, which are excerpted below.

ISAF OFFSHORE SPECIAL REGULATIONS SF Bay OYRA Prescriptions ONLY

- 2.01.3 All OYRA races are category 2 races.
- 2.03.3 Navigation lights shall be shown from Sunset to Sunrise and when visibility is reduced to two miles or less.
- 3.08.5 b) Hatch boards shall be secured while racing.
- 3.08.6 OYRA prescribes Hatch Boards shall be in good condition with means to secure. Deck Hatch shall be water tight. Locker Hatch shall be securable.
- 3.14.7 OYRA prescribes for boats less than 30' the requirement for lifelines and pulpits is waived provided jackstays are installed.
- 3.18.1 OYRA prescribes that a fitted bucket is acceptable.
- 3.20.1 OYRA prescribes cooking stove capable of being safely operated at sea is recommended but not required.
- 3.21.1 OYRA prescribes the requirement for permanently installed delivery pump and water tank is waived.
- 3.23.5 a) OYRA prescribes for boats under 30' at least one permanently installed manual bilge pump of 10 gallons per minute capacity operable with all hatches and companionways closed.
- 3.28.1 e) The requirement for permanently installed propulsion engine and fuel tanks is waived. A boat must have either an inboard or outboard engine and fuel for eight hours of operation meeting the performance specifications above.
- 3.29.1 n) OYRA prescribes that an AIS transponder is not required but that an AIS receiver is recommended.
OYRA prescribes that a Cell phone in a waterproof container must be carried on each yacht.
- 4.19.1 The Requirement for a 406 MHz EPIRB is amended to say that a 406 MHz EPIRB OR a 406 MHz PLB unit shall be provided. All EPIRB/PLB Devices must be properly registered with the appropriate authority.
- 4.20 OYRA prescribes that unless specifically designated in the Notice of Race the requirement for a life raft is waived. For specifically designated long distance Offshore Races, a life raft capable of carrying the entire crew which must have a valid annual certificate from the manufacturer or an approved agent certifying that it has been inspected and stating the official capacity of the raft that shall not be exceeded.
- 4.21.2 Grab bags requirements are waived.
- 4.23.1 OYRA prescribes that for yachts under its jurisdiction, SOLAS flares may not be more than 6 years old except orange smoke flares which may not be more than 10 years old.
- 4.26 OYRA prescribes storm & heavy weather sail requirements are waived and the following substituted: One heavy weather jib sized for the boat is required if boat is equipped to carry a headsail. Main sails sufficiently strong for heavy weather and able to be reefed with adequate trimming devices to handle heavy weather conditions.
- 5.01.4 OYRA prescribes that adequate personal flotation will be worn at all times while on deck.
- 5.04 OYRA requires Foul Weather Suit for each crewmember.
- 5.05 OYRA requires a knife for each crewmember and recommends that it be carried while on deck.
- 5.08 OYRA requires a Man-Overboard practice.
- 6.04.1 OYRA prescribes that Safety @ Sea training is strongly recommended.



Commander
Sector San Francisco

1 Yerba Buena Island
Building 22
San Francisco, CA 94130
Phone: (415) 399-7440
FAX: (415) 399-7480

16750
05 Apr 2012

Informative Agency Disclaimer

Issuing a permit does not imply any endorsement of the activity, guarantee that it will be accident free, or make the Coast Guard responsible for the safety of the participants.

Yacht Racing Association of San Francisco Bay
Attn: Laura Muñoz
1070 Marina Village Parkway, Suite 202-G
Alameda, CA 94501

Dear Applicant:

Your marine event application is approved for the following:

Marine Event Permit Number:	SF-12-0914
Event:	YRA/OYRA Full Crew Farallones Race
Dates:	April 14, 2012 – 9:45AM to April 15, 2012 – 8 PM
Event Type:	Offshore Sailboat Race
Number of Vessels:	35-45 sailboats; 20' to 50'+
Location:	St Francis Yacht Club Race Deck to Southeast Farallon Island then returning to St Francis Yacht Club.
Point of Contact:	Anne McCormack – (415) 453-9133 VHF Channel: 69
Sponsor Provided Safety:	None required
Coast Guard Resources:	None requested
Safety Zone Requirements:	None required
Environmental Review:	Categorically excluded from environmental review NEPA-90 (CATEX attached)

Marine event sponsors are responsible for the safety of their events. This permit does not exempt the event sponsor or participants from any Federal, state or local laws or regulations, including county no-wake zones. You may be required to obtain additional permits required by applicable local municipalities, the State of California or other Federal agencies. This permit does not grant permission to use any private property that may be impacted by your event without the consent of its owner. In addition please note that this permit does not allow closure of any navigable waterway or placement of unapproved buoys associated with your event. **Unless you have already done so please contact Sergeant Keith Matthews of the San Francisco Police Department Marine Unit at (415) 409-1020 and notify him of your intentions so he may advise you of any additional local requirements.**

Parts of San Francisco Bay and adjacent waterways are considered "narrow channels or fairways" by the U.S. Coast Guard. **Please remind all event participants that this permit does not exempt them from following Rule 9 of the Navigation Rules, which prohibits interference with vessels that can only navigate within these areas.**

16750
05 Apr 2012

For your safety and the safety of others, we must require that you check in with Coast Guard Vessel Traffic Service (VTS) San Francisco before you make any last minute changes to the location or time of your event, before your event begins and immediately after it concludes. VTS can be reached at (415) 556-2760 or on VHF-FM Channel 14 (156.7 MHz). This requirement is necessary to ensure that your event is considered as VTS Controllers continually evaluate the ever-changing traffic conditions on the Bay and adjacent waters. **You must also monitor Channel 14 during your entire event so that VTS can be sure of your exact location at any time.**

It is imperative that your organization maintain 100% accountability for event participants. To maintain accountability, event participants are required to adhere to the OYRA Sailing Instructions and Communications Plan. If your event concludes and there is not full accountability of each participant, immediately notify the Coast Guard Command Center at (415) 399-3547. If a participant vessel is one hour overdue for any roll calls, contact the USCG Command Center at the above number. In either of these cases, the Coast Guard will then conduct call outs for the unaccounted for vessel on VHF-FM channel 16. If the vessel in question cannot be reached, the Coast Guard will initiate a search for the vessel.

The importance of your responsibility to maintain 100% accountability for your event participants cannot be overstressed. Failure by either the event coordinator or event participants to maintain diligent communications in accordance with the OYRA Sailing Instructions and Communications Plan, could result in unnecessary searches for safe but unaccounted for vessels; however, if all participants and coordinator reliably follow the communications plan, then an actual distress situation is more likely to be recognized quickly and responded to early. Safety of event participants is the Coast Guard's top priority for your event.

In the unlikely event of a watercraft collision with a marine mammal, the event sponsor must immediately contact the NMFS Stranding Coordinator, Mr. Joseph Cordaro at 562-980-4017.

We hope you have a safe and enjoyable event. If you have any questions or need to advise us of any changes to your event, please contact MST1 Joshua Clark at (415) 399-7440 or email D11-PF-MarineEvents@uscg.mil.

Sincerely,



D. A. JANSZEN
Lieutenant Commander, U.S. Coast Guard
Chief, Waterways Management Division
By direction

Enclosures: (1) OYRA Sailing Instructions
(2) Off-Shore Sailing Race Communications Plan

Copy: U.S. Coast Guard Station San Francisco
U.S. Coast Guard Station Golden Gate
Air Station San Francisco
Sector San Francisco Command Center
U.S. Coast Guard Vessel Traffic Service

U.S. COAST GUARD
CATEGORICAL EXCLUSION DETERMINATION
FOR

Yacht Racing Association of San Francisco Bay

“YRA/OYRA Full Crew Farallones Race”

April 14, 2011 – 9:45 AM to April 15, 2012 – 8 PM

USCG Sector San Francisco Marine Event Permit SF-12-0914

The marine event described in the attached permit has been thoroughly reviewed by the U.S. Coast Guard. It has been determined by the undersigned to be categorically excluded under current Coast Guard CE #35(a) from further environmental documentation, in accordance with 2.B.2 and Figure 2-1 of the NEPA Implementing Procedures, COMDTINST M16475.1C, since implementation of this action will not result in any:

1. Significant cumulative impacts on the human environment;
2. Substantial controversy or substantially change existing environmental conditions;
3. Impacts which are more than minimal on properties protected under the National Historic Preservation Act;

04/05/12
Date


Preparer

Marine Event Coordinator
Title/Position

4/11/12
Date


Responsible Official

Chief, Waterways Management Division
Title/Position

Off-Shore Sailing Race Communications Plan

YRA/OYRA Full Crew Farallones Race SF-12-0914

April 14, 2012

1. Before the start of the race, the race committee will provide the Coast Guard with the vessel particulars for each entrant that includes:
 - a. Boat description and, if available, a photo
 - b. Boat's home berth location
 - c. On-board cell number
 - d. Emergency contact name and phone numbers
 - e. List of safety equipment carried on board

2. During the race, the **race committee** is required to:
 - a. Adhere to the OYRA Sailing Instructions
 - b. Maintain a live communications watch for the duration of the entire event
 - c. Check in with VTS at start & conclusion of race, and every 4 hours during the race
 - d. Inform USCG Sector San Francisco Command Center (SCC) of the names of any vessels still participating or unaccounted for in the race, immediately after the conclusion of the event.
 - e. The race committee will also conduct a roll call at the conclusion of the scheduled race time, and every 30 minutes thereafter, until all vessels have finished. If any vessels are unaccounted for, the race committee will notify SCC immediately
 - f. Inform VTS when the last vessel has completed the race on Channel 14 or at (415) 556-2760

3. During the race, **competitors** are required to:
 - a. Adhere to the OYRA Sailing Instructions
 - b. Have a VHF-FM marine-band radio close at hand at all times during the race
 - c. Check in with Race Committee in accordance with the OYRA Sailing Instructions.
 - d. Notify the Race Committee in accordance with the OYRA Sailing Instructions, if retiring from the race and upon dropping out or completing the race.
 - e. If possible, keep your cell phone on during transit.

*WEATHER PARAMETERS FOR CALLING OFF A RACE – YRA/OYRA is required to contact USCG Station Golden Gate for the latest weather conditions at (415) 331-8247 prior to sailing. If weather conditions are determined to be unsafe for holding the event, the YRA/OYRA will be responsible for cancelling the event or utilizing an alternate race course.

Permit/Instruction Letter for Race Committees

Coast Guard Permit Number SF-12-0914

YRARaceNo: 7

RaceName Full Crew Farallones Race

Date: 4/14/2012

Contact: Jeff Zarwell Sponsor San Francisco YC

Channel: 69

To: Race Committee Chairman:

From: Laura Paul, Executive Director, YRA

Thank you for hosting the above referenced YRA regatta. All the information you need to run this race has been emailed to you, including racing instructions, starters list, finishing sheets and results worksheets. If you are missing anything or have any question, please let me know.

Before your race starts, you must check in with the Coast Guard Vessel Traffic Service (VTS) on Channel 14 and give them your permit number listed above. You should monitor Channel 14 during the race and check out with VTS when it is concluded.

Please post the finish times on the work sheets and note the course number, any change in the starting time (postponement, general recal or whatever). Please be sure to note the wind speed on an average for the race.

ODCAWBRA - Please list finish times if available. If a class does not start, mark them as DNC

NEW PROCEDURES TO ACCESS THE YRA PHONE SYSTEM!!! To access the YRA voicemail to check for DNF'ers, dial 415-771-9500. When the Voicemail picks up press the * key. Voicemail will prompt you for the mailbox password/pin. The password/pin is 'YACHT' or 92248. You may erase those messages that pertain to your race once you have accessed them. For OYRA Race Committees, you have been supplied with the contact information for all the racers in your race. If you have a missing racer please do not hesitate to start calling the numbers provided. You can also reach me on the YRA cellphone at 415-994-4711. For Non-OYRA Race Committees, if you have a missing racer you are concerned about, you can call the YRA cell phone number and I can help make phone calls to track someone down.

Please return one copy of the finish worksheets to the YRA office. Please keep a copy of the finishing sheets and starters list in case someone has a question or if a boat accidentally gets missed and needs to be added. Also, don't forget to fill in your race committee information.

Please have the results back to the YRA office by noon on the Monday following the race. You may fax the results to 415-276-2378 at anytime after the race. If you fax the pages to the YRA office you do not need to mail the hard copies.

Thank you again for your support of the YRA. If you have any problems or questions, please don't hesitate to contact me. During the weekends you can reach me on the YRA cell phone: 415.994.4711.

Have a great Race!

Wednesday, April 11, 2012

Page 1 of 1

Appendix B: Vessel Information

Type	Sydney 38 MOD,
Sail #	38009
Rating	27
Owner	James (Jay) Bradford
Club	SFYC
Marina	San Francisco
Berth	323
S/I	119-120

Bradford bought the boat in 2006. It has been raced hard, but was extensively re-fit in February 2012 by professional boat builders in preparation for the Pacific Cup race from San Francisco to Hawaii.

Safety Equipment on boat during FC Farallones Race:

Throwable gear mounted to pushpit: Life-ring with MOB pole, throw line in bag, Lifesling, light.

Instruments: Raymarine "Raychart" chart plotter RC520 Plus, Hand-held GPS unit (Alan Cahill's), Fixed-mount VHF radio, ICOM, IC-M802, Two (2) hand-held VHF radios, one used for pre-race check-in.

EPIRB: ACR Rapid Fix 406 Model. Can be deployed automatically or manually, water activated.

Optional GPS interface through an optical infrared diode. No GPS locations were received from this EPIRB during the incident. The EPIRB was properly registered and the registration was current.



Low Speed Chase sailing outside Golden Gate Bridge in 2012 Full Crew Farallones Race



LSC Chartplotter displayed as found after recovery from island.

Appendix C: Crew Details

Low Speed Chase Crew for the 2012 Full Crew Farallones Race

Crew Name	James (Jay) Bradford	Bryan Chong	Nick Vos	Marc Kasanin	Elmer Morrissey	Jordan Fromm	Alexis Busch	Alan Cahill
Role on LSC	Owner, crew	main trimmer	foredeck	mast	crewhand	jib trimer	crewhand	Skipper
								
Position From bow when wave hit	4	7	2	1	6	5	3	8
Age	41	38	26	46	32	25	26	36
Prior experience	Multiple off-shore races including Hawaii and Farallones races	Multiple off-shore races, first time on LSC, first Farallones race	Multiple off-shore races & deliveries, including Hawaii, Sydney-Hobart, Farallones, 2nd most experienced	Many in-shore races, not many off-shore races	Possibly first ocean race, first time on Low Speed Chase, least experienced	Multiple off-shore races including Farallones races	Ten years in near coastal waters, 2nd least experienced	Multiple off-shore races & deliveries, including Hawaii races, 10+ Farallones as crew, most experienced
Wave affect:	in water, separated from boat after first wave	in water after second wave	stayed on boat	in water, separated from boat after first wave	in water, separated from boat after first wave	in water after first wave, separated from boat after 2nd wave	in water, separated from boat after first wave	in water after first wave, separated from boat after 2nd wave
Date found	survived	survived	survived	4/14/2012 (hours post accident)	5/2/12(18 days post accident)	4/26/12(12 days post accident)	Missing/Presumed Deceased	Missing/Presumed Deceased
Location Rescued/Found:	Farallones	Farallones	Farallones	Farallones	Farallones	Farallones	not found	not found
Injuries:	None	Rib Contusions(minor injury)	Hairline Fx fibula(minor injury)	Deceased. Coroner's Final Report (San Mateo)	Deceased/Medical Examiners' Interim Report(SF)	Deceased/ME Interim Report(SF)	unknown	unknown
Cause of Death	n/a	n/a	n/a	Drowning- Accidental, Mutiple contusions/abrasion, no signifcant head injury	Drowning- Accidental, 4 rib fractures, R side of chest	Drowning- Accidental	Presumed drowned	Presumed drowned
Incidental ME Findings:	None			Enlarged heart, probabable hypertension(not contributory to death)	None	Coronary artery narrowing(not contributory to death)		
Toxicolgy:				Negative	Pending	Pending	n/a	n/a
PFD Type/Brand (based on interviews and photographs and may not be 100% accurate.)	West Marine 4000 auto-inflate conforming life jacket with harness from 2005-2007, #6830269	West Marine 4000 auto-inflate conforming life jacket with harness from 2005-2007, #6830269	Stohlquist Drifter foam vest, Type III, 16.6# bouyancy	Older WM model 35# inflatable with harness. Could have been made in 2001 to 2003	"Automatic Sentinel" life jacket/harness about 2003. White patch may be tape to contain the inflator.	Zhik foam vest, non-conforming, providing only 11.2# bouyancy, 1/3 the CG requirement	West Marine "Offshore Sailing Manual Inflatable Life Vest" from 2008 and 2009, #9412669	fanny pack - requires manual inflation and secondary donning
PFD inflated?	yes	yes, manual tab tucked away	n/a	Bryan 99% sure it did, then ripped off by rocks.	unknown, pull tab taped to prevent false inflation	n/a	unknown	no
Harness?	yes	yes	no,climbing harness	yes	yes	no	yes	no
Tether attached to harness	yes	yes, looped around neck, no beads on release string	no	no	no	no	no	no
Foulweather gear?	full set	full set	full set, Henry Lloyd jacket, thermals, Musto HPX boots	shorts & foul weather top, running shoes	full set, boots, extra warmth layers	full set, boots	full set Henry Lloyd, thermals, boots	full set
Tethered to boat?	no	no	no	no	no	no	no	no
Seasick?	no	no	no	no	yes	no	yes	no



Figure 1 - Crew bow to stern: Kasanin, Morrissey, Busch, Fromm, Bradford, Chong



Figure 2 – Low Speed Chase anchored at start. Crew bow to stern: Kasanin (behind jib), Busch, Morrissey (with electric tape), Chong (kneeling), Vos (white hat), Cahill (gray vest at wheel)

Appendix D: Weather Considerations for the Full Crew Farallones Race, April 14 2012

By Jim Corenman, with contributions from Jim Antrim

Forecast:

The coastal waters forecast for 0825 April 14 was unchanged from the afternoon before, and was for NW winds 15 to 25 kts, wind waves 3 to 7 feet, NW swell 12 to 15 ft at 13 seconds.

```
COASTAL WATERS FORECAST
NATIONAL WEATHER SERVICE SAN FRANCISCO BAY AREA
825 AM PDT SAT APR 14 2012

POINT ARENA TO POINT PIEDRAS BLANCAS AND OUT 60 NM INCLUDING THE SAN FRANCISCO BAY AREA AND
MONTEREY BAY

PZZ570-142200-
POINT ARENA TO PIGEON POINT 10 TO 60 NM OFFSHORE-
825 AM PDT SAT APR 14 2012

...SMALL CRAFT ADVISORY IN EFFECT THROUGH LATE TONIGHT...

.TODAY...NW WINDS 15 TO 25 KT. WIND WAVES 3 TO 7 FT. NW SWELL 12 TO 15 FT AT 13 SECONDS.
.TONIGHT...NW WINDS 15 TO 25 KT. WIND WAVES 3 TO 7 FT. NW SWELL 9 TO 12 FT AT 12 SECONDS.
.SUN...NW WINDS 10 TO 20 KT. WIND WAVES 2 TO 4 FT. NW SWELL 7 TO 9 FT.
.SUN NIGHT...NW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. W SWELL 4 TO 6 FT.
.MON...NW WINDS 10 KT. WIND WAVES 2 FT OR LESS. W SWELL 6 TO 8 FT.
.TUE...W WINDS 10 KT. WIND WAVES 2 FT OR LESS. W SWELL 8 TO 10 FT.
.WED...NW WINDS 5 TO 15 KT. WIND WAVES 1 TO 3 FT. W SWELL 7 TO 9 FT.
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A typical sea-state is made up of a mixture of waves from different sources which all combine to form the typically chaotic ocean surface. Periodically the wave peaks will coincide to produce especially large waves, and at other times they will largely cancel each other. So there is no single “wave height” that will describe all waves, instead the forecast will describe a “Significant Wave Height” (H_s), which is defined as the average of the largest one-third of all waves. This is also the wave height that an experienced observer will typically report.

The individual wave heights are a statistical distribution, and in general the average of the highest 10% of all waves ($H_{1/10}$) will be 1.27 x higher than the significant wave height, the average of the highest 1% of all waves will be 1.67 x higher, and the maximum wave height (out of thousands) is generally considered to be 2.0 x higher than the significant wave height.¹

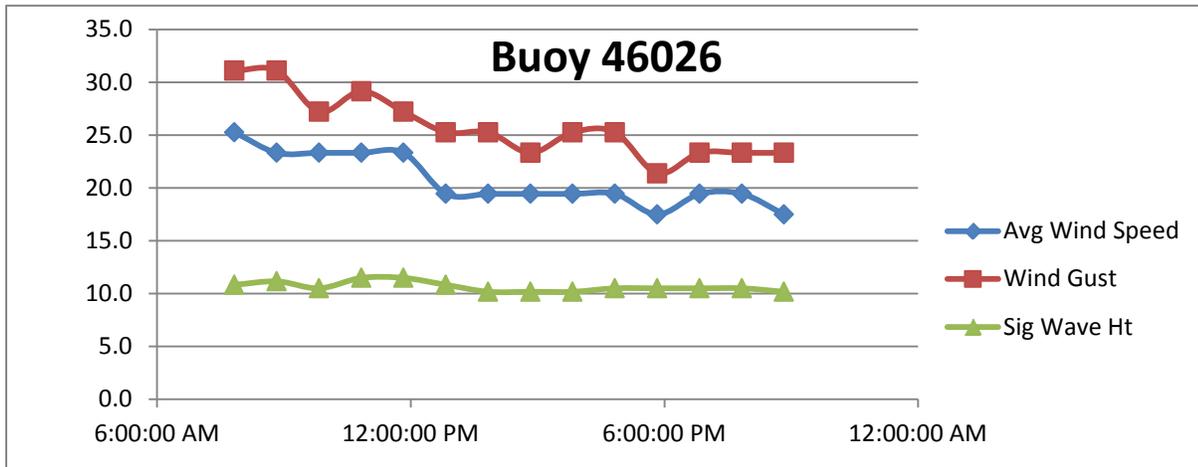
The sea-state forecast was for wind waves 3-7 ft and a NW swell 12-15 ft at 13 seconds. Wind waves are independent of the swell, and add to the wave height as the square root of the sum of the squares.² Taking the high end of each forecast range yields a combined significant wave height of $\sqrt{15^2 + 7^2} = 16.5$ ft. The highest 10% of the waves would then average 21 ft, and the highest 1% would average 28 ft, occurring a few times an hour. The highest expected waves for this forecast would be 33 ft.

¹ “Significant Wave Height, A closer look at wave forecasts”, Tom Ainsworth, NWS Juneau, Alaska
<http://www.mxak.org/weather/pdfs/waves.pdf>

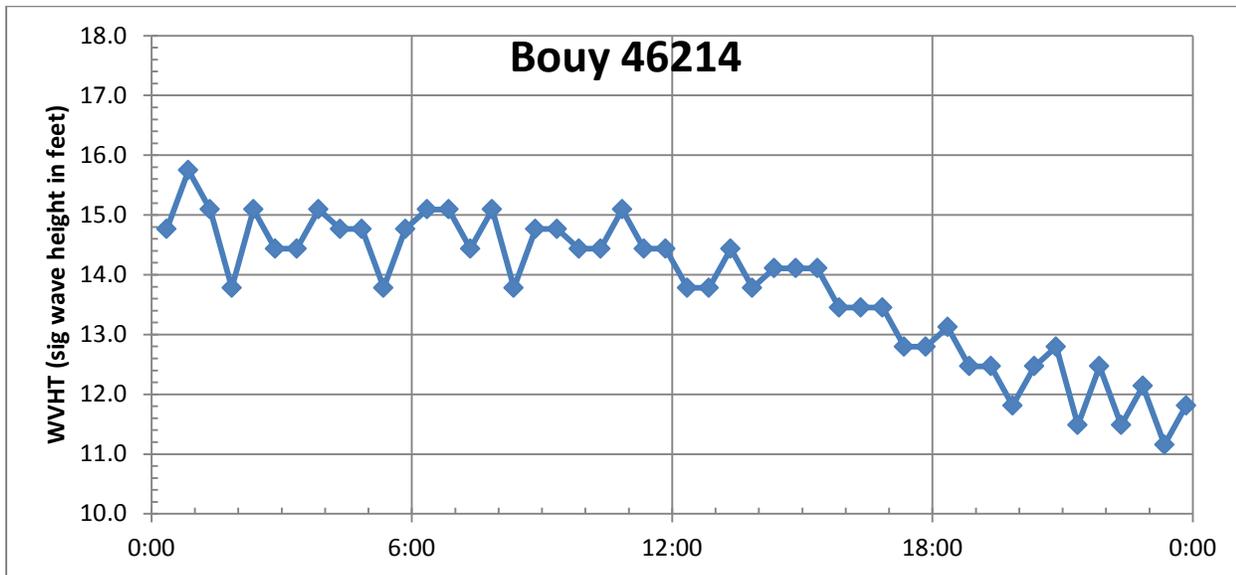
² “Wave Types and Characteristics”, COMET MetEd Program
http://www.meted.ucar.edu/marine/mod1_wv_type_char/print.htm

Actual conditions:

Weather buoy 46026 (37°45.5'N 122°50.0'W, 8 miles ENE of the Farallones) was reporting winds of about 20 kts gusting 25 at around the time of the incident. Winds earlier had been stronger, 25 kts gusting 30 and easing around noon. Significant wave height was 10 feet at 14 seconds between 2 and 4 pm, down from 11-12 feet at 15-16 seconds during the morning hours.



Buoy 46026 is partly sheltered from some waves by Point Reyes. There is also a “Waverider” buoy (46214) 20 miles west of Pt. Reyes and 25 miles NW of the Farallones, in deep water at the edge of the continental shelf. Since this buoy is some distance from the Farallones, consideration needs to be given to how long it takes waves to travel the 25 mile distance.



The longest-period ocean swell will travel the fastest, and a deep-water wave with a period of 14 seconds will travel at 42 knots, but the group velocity—the speed at which a set of waves moves from one place to another—will be half of that, or 21 knots. The wave length, period of the waves, and the wave velocity are all interrelated: the wave velocity in knots is 3.0 x the wave period in seconds, and the wave length in feet is 5.1 x the square of the period. So the smaller waves will travel more slowly, but it is the largest waves that have the greatest potential for breaking in shallow water.

So the travel time from the Waverider buoy to the Farallones would be 71 minutes for waves with a 14-second period, with larger waves traveling faster and smaller waves traveling more slowly. The 46214 buoy reports data every 30 minutes, so the observation at 13:21 would be the best representation (75 minutes before the capsize), with a 14.4 ft significant wave height at 14.3 seconds. The preceding and following observations were both 13.8 ft with the same 14.3 second period, and the general wave pattern through this period was relatively stable.

A significant wave height of 14 ft with a period of 14 seconds is therefore a good representation for estimating actual conditions at the Farallones, and will be used for the remainder of this discussion. The largest 10% of the waves would then average 18 ft and the largest 1% would average 23', and the maximum expected wave height would be 28'.

Tide and Current:

Low tide at SE Farallon Island on April 14 was 0.1 ft @ 13:02, and the following high tide was 4.7 ft at 19:48. At 14:36 (the time of the capsize) the estimated height would have been 0.7 ft. ³ LSC's track was inside the 4₃ fathom sounding (27 ft), so the water depth at that time would have been 28 ft.

The Farallones are beyond the influence of tidal currents from San Francisco Bay, but do lie within the California coastal current that flows southwards, at speeds generally less than one knot.

Wave considerations:

We have all stood on the beach and watched waves roll in. They come in with a rounded or softly peaked crests, like the waves we observe at sea; but as they reach the shallow water of the beach the distance between wave crests shortens, the waves build in height, and the crest sharpens dramatically. If the beach slope is gentle then the wave will collapse gently, and the peak will spill down the face as a "spilling breaker". If the beach slope is steeper the waves will peak more quickly to a vertical face which then curls over and collapses into the trough ahead. These are "plunging breakers" and in their early stages are the classic surfing waves, not something a boater ever wants to see.

Whether or not a wave will break in shallow water depends on the size and steepness of the wave, the depth, and the shape of the bottom contour. Wavelength and period are related, and the wavelength (L) of a wave with a 14-second period is 1000 ft. Depths over half of that (L/2 or 500') are considered "deep water", and depths of less than L/20 (50') are considered "shallow water" for wave dynamics

Waves slow down as they reach shallow water and "feel the bottom", but the period is unchanged so the kinetic energy is converted into the potential energy of a slower, taller wave. This increases as the depth decreases until the wave becomes unstable and breaks. If this happens gradually (e.g. a gently-sloping beach) then the waves will form "spilling" breakers, with the water tumbling down the sloping face of the wave. If the breaker forms quickly (e.g. a faster-moving wave and a more steeply-sloping shoreline) then a "plunging" breaker forms, with the face becoming vertical, curling, and then collapsing into the trough. (In

³ Calculated with Coastal Explorer and verified by NOAA tide tables and cosine interpolation.

the early stages these are the classic surfing waves). The critical question is at what depth breakers will form.⁴

The LSC incident occurred on the 4-fathom shoal that extends north from Maintop Island. The effect of shoaling depends on the wave period, and also on the bottom contour. The bottom at that location rises from 14-17 fathoms (84-102') to a depth of 27' over a distance of around 400 yards, a slope of roughly 1:20—considered “average” for breaking-depth calculations.

The height of a breaking wave depends on the deep-water wave steepness as well as its height, and also on the bottom slope. This is described as a “shoaling factor”, which is the ratio between the deep-water wave height and the height of the breaking wave, and is found from an empirical nomogram from the deep-water wave steepness and the bottom slope.⁵

The deep-water wave steepness (height-to-length ratio) of a 14' significant wave height with a 14 second period is 0.014 (14' divided by a 1000' wavelength). For an average 1:20 slope the “shoaling factor” for these waves would be 1.51.⁶ This is a description of how high a breaker can form as the depth decreases on that slope. This in turn yields a “shoaling breaker height” of 21' (1.51 x 14'). In other words, a 14' wave could rise to a 21' breaker before collapsing.

To find the breaking depth, i.e. the water depth where waves will break, one more term is needed—the “breaker steepness”, which is a measure of the just-computed breaker height relative to the original (unchanged) period: specifically, breaker height divided by (g x period squared), where “g” (gravity) is 32 ft/sec². For this example the breaker steepness is 0.00335.

The “breaking depth coefficient” can then be found on another empirical nomogram,⁷ which again is a function of the steepness of the bottom slope, and which yields 0.98. This coefficient is then multiplied by the shoaling breaker height to find the depth at which the wave will break, or 20' in this case.

So for a 14' significant wave height with a 14-second period, most of the waves will not break on the 28' shoal. This is also consistent with the observations. But if these calculations are repeated for the average of the largest 1% of the waves then the results are quite different: the shoaling breaker height becomes 31' and the breaking depth is 30'. This means that a few waves an hour would be expected to rise to 31' and break on that shoal. These would also be “plunging” breakers, i.e. becoming vertical, curling and collapsing, which is also consistent with the observation from Chong on LSC.

These numbers are also consistent with a common rule-of-thumb that waves will generally break if the depth is less than 1.3 times the wave height. For a 14' significant wave height, 1% of the deep-water waves will average $1.67 * 14 = 23'$, which will break in 30' of water. This yields the same number with a much simpler calculation, which works because the wave steepness and bottom in this case are pretty “average”.

⁴ “Shallow Water Waves”, COMET MedEd Program, <http://www.meted.ucar.edu/marine/SWW/print.htm>

⁵ <http://www.meted.ucar.edu/marine/SWW/print.htm#a222>

⁶ <http://www.meted.ucar.edu/marine/SWW/print.htm#a223>
http://www.meted.ucar.edu/marine/widgets/#shoaling_nomo

⁷ http://www.meted.ucar.edu/marine/widgets/#breaking_depth_nom

It should be noted that larger waves will occur, but less frequently. With a 14-second period there would be roughly 257 waves per hour of all sizes (the math is exact but ocean waves are not). The largest 1% occur at the rate of 2.6 per hour and will average $1.67 * 14'$ in height, or 23', and will break in 28' of water. If we reverse the question and ask what depth is required to reduce the number of breaking waves, the largest expected wave is generally considered to be twice the significant wave height, or 28'. The water depth to avoid breaking would then be 36.5 feet (6 fathoms), using the 1.3x rule-of-thumb.

Calculating Minimum Depth: Given a weather forecast, there are a number of ways to figure a reasonably safe minimum water depth. Forecasts typically include a swell forecast (i.e. waves from outside the immediate area) and wind-waves generated by the forecast winds. These are usually given as a range, and the maximum forecast for each should be used.

The mathematically-inclined could combine swell and wind-wave significant wave heights as the square-root of the sum of the squares, then multiply that by 2.0 to get the largest expected wave, and then multiply that by the 1.3x rule-of-thumb to get minimum water depth, then add some margin in case the waves are larger than forecast. Doing this for a 15' swell and 7' wave forecast would yield a minimum depth of 43', to which some margin needs be added.

Stan Honey uses a simpler rule for minimum depth, of 2.5x the sum of the maximum forecast swell and wind-wave heights. This sum will be larger than the square-root of the squares, which adds some safety margin. For our forecast 15' swell and 7' wind-wave, this calculation would yield a minimum depth of 55'.

Another rule for minimum depth is to simply multiply the deep-water significant wave height by 3 (or 4, for some additional margin)⁸, which would be a minimum depth of 45-60' for our 15' swell forecast.

And another rule for breaking depth is wave-length divided by 20. The problem here is that the forecasts (and buoy reports) cite period, not wavelength. Those are related— wavelength (in feet) is 5.1 x the period squared— so for our 15', 13-second swell forecast the wavelength would be of 862' and a minimum depth would be 43', to which some margin needs to be added.

Bottom line: Two boats have submitted GPS tracks that were inside the 6-fathom curve, and also inside the 4₃ fathom sounding. One was lucky, one was not. Several others violated the depth guidelines discussed in this report, although not as egregiously. Most were well outside the 6 fathom curve, in at least 8 fathoms.

Sidebar: Years ago, after a particularly nasty Sydney-Hobart race, Australia's Bureau of Meteorology started adding the following to the top of each coastal forecast: "Wind gusts can be 40 percent stronger than the averages given here, and maximum waves may be up to twice the height".

Reviewed with naval architects and NOAA and USGS oceanographers

⁸ "Max Ebb's Breaking Point", Latitude 38 June 2012 pg. 106-108,
<http://www.latitude38.com/eBooks/2012/L38201206.pdf>

Appendix E: Capsize Incident Details from Survivors

Jay Bradford: Farallones Race - Low Speed Chase Survivor - Interview

Name: Jay Bradford

Boat: **Low Speed Chase**

Date/Time: **24 May at 1300**

Interviewers: Bill Barton, and by phone Sally Lindsay Honey

Written by Bill Barton

Jay Bradford owned Low Speed Chase and was aboard for the 2012 Farallones Race. He had hired Alan Cahill to serve as captain for the race. They did not have a separate navigator or tactician aboard. Jay Bradford was listed as captain on the race entry form. Jay moved to San Francisco and started sailing here in 2005. He did his first Coastal Cup, did a Farallones race, Half Moon Bay race, other coastal stuff, a Cabo to Newport, one Pacific Cup and a Newport Ensenada. He served as crew on these races. He took a basic sailing course and also attended one Safety At Sea seminar in preparation for a Pacific Cup. He said, "Alan Cahill had been a professional sailor for as long as I had known him. He was still trying to get a position on a Pacific Cup boat. I think he sailed a lot of different places."

"Crew was well rested on race day, no issues there. Alan and I spent the day before the race checking the radios, sails, what sails to bring. We fixed the VHF and tested it to the SFYC. We checked the handheld VHF's, on race day we checked in with the Race Committee on one handheld. So, we got one handheld working, the other needed charging. We had to try and find a charger from another boat to fit it."

Alexis was the only one who seemed to have any seasickness during the race. People had a few beers after a practice sail we did the night before the race. Bryan Chong could not make the practice sail, but everybody else did. We did some tacks and jibes, threw the spinnaker up, just getting ready.

Jay had full foul weather gear at the start, took it off at one point at start when it got hot and we were at anchor. Once they got going he was back in foul weather gear. He was wearing PFD with tether and harness, West Marine 4000 model. Alan Cahill some type of inflating thing. Jordan had something you wear but do not inflate; Bryan and Alex had auto-inflating PFDs. Mark had a red lifejacket, not self-inflating. (Note: photos and other accounts show Mark had an inflatable PFD.) Everyone brought their own safety gear, so he did not know when some units may have been inspected. He replaced the tablet last year on his PFD, but not this year. They did not have a discussion on the boat about when to use tethers. "The seas were pretty big, but not huge. We were all on rail and tangled up in it. Nobody thought a tether was warranted." They did not do safety drills before the race, although Bryan checked the fire extinguishers.

The fixed GPS at the nav station may have been running on race day. Currently the unit is in a storage locker outside San Francisco in Richmond. Jay's brother can arrange for panel to get the unit so that the track can be obtained. On race day he asked Alan if he wanted him to put a waypoint in the fixed GPS. Alan said "no I already got it where I want it." "I think he had one in fixed GPS, definitely one in handheld. The Coast Guard has that waypoint. He used handheld for a lot of the races. He had a lot of different points in it."

The EPIRB aboard Low Speed Chase did not appear to be registered to her. Jay said it may have been previously registered to Big Time or Double Trouble, previous names of the same boat under previous owners. He thinks they did register it last year; he had to get a new sticker last year. "Note: The EPIRB currently has a sticker identifying the vessel name as Mistral.)

"We all shared a lot of things on an ocean race depending on how long it was. Alan did the start because he was best at that. We all took turns. Alan took helm while rounding, he could get more speed; Alan did most of the driving. Bryan officially did Mainsail and was behind the wheel a bit. Nick and I did some main. Nick and Jordan did foredeck. Elmer wanted to learn foredeck; but did none because it was wavy. Elmer was on foredeck some the night before during practice. We changed the headsail as wind built, went down to the #4 genoa."

Jay filed the original race entry form and listed himself as captain. Alan filed an amendment showing Bryan as an addition to the crew.

Jay recollects a weather forecast with 12-foot seas and about 20 knots of wind, “and that is exactly what it was.” He checked the forecast just before the race and on computer. “I think somebody had a printout aboard of the weather.” They did not get new forecasts after the start. The largest waves he anticipated based on the forecast were 12 feet, maybe some 15 footers. “Some sets of waves were bigger, they came and went. At the island it was a little over 20 knots, we never saw 30. At the island we saw 14 foot waves; the wind was moving them around.” They did not discuss withdrawing from the race on the way to the islands.

The rounding strategy was that Alan had a waypoint. “We were all thinking about what sails to use going home. We thought no spinnaker. We were several hundred yards off the island. I did not notice, but Bryan and Nick said Alan was bearing off after the first point of land. They said they cracked the sails at some point. Alan had done the race. I have done it 4-5 times. We were several 100 yards from the island, not breakers. It was not discussed.” No recollection of depths. “There were boats ahead and behind us.”

“When we rounded Alan was driving, Jordan, me, Alex, Nick, Mark were on the rail. Elmer said the island looks like something from Lord of the Rings. Everybody was suited up because we were getting spray. Mark was wearing shorts and a foul weather top. Everyone supposed to have a PFD. We tell everybody they have to have a lifejackets and tether that can be tied on to do the race. I maybe have two or three tethers on the boat. If someone does not have one they have to call and make sure I have one for them. We had a full main and a #4 genoa; it felt comfortable and boat speed was up in the eights. The companionway hatch was closed to keep spray out. Alan had one handheld VHF. The other was below in a waterproof bag with batteries and flashlights. We got some bigger sets of waves, then calmer, then bigger, varying in size.”

“We were going along, and someone said, ‘Look how big that wave is.’ Nobody was screaming, Alan turned into it a bit. We knew we would get hit a bit. People were making some “Whoa!” noises and grabbing lifelines, just expecting a hit; then it started to seem a lot bigger. It hit me and I thought it was just another wave. Then I thought possibly my legs were broken. I could not hold onto the lifelines. Next moment I was knocked across to the other life lines on the port side. We did a roll, I am not sure if it was a 180 or 360 roll. Pretty sure we were under water. Then I was in the water close to boat on port side. I was thinking I have to get back in that boat. There was a line in the water, I started pulling and it came lose and I got to the end. Another wave hit. Then I saw the boat between the island and myself and I was looking up and seeing the mast snapped, I realized the boat was in big trouble. I was crying almost at this point. The waves bobbing you up and down, then the boat was gone. I knew I was going into the breakers, didn’t know what would go on. I was tumbling and rolling around for a while, ended up in the rocks and saw Mark and he got washed in. I got to a rock and was able to get on it. I eventually saw Mark floating upside down. Then he disappeared around the rocks. I was pretty much there until the Coast Guard came. Bryan and Nick asked if I was ok; the Coast Guard asked if I was ok. The Coast Guard could not get me; so, the Air Force came with other copters.

“Mark and I were close for a bit, he stood up in the shallows, then a wave hit and we were separated again. The only other crew I saw were Nick and Bryan on a ledge/cliff above me. The Coast Guard said just stay there. Nick went on the boat. I heard he tried the VHF on boat but the mast and antenna were down. Not sure if the VHF had power. I heard later the EPIRB was going off and flashing.

“On the stern of the boat there was a life-ring with MOB pole attached. No light was attached because it was not dark yet, drogue. There was a heaving line in bag.

“I saw no other swimmers in water. Sails may have been blocking the view; I was so low in the water. I only saw Mark in rocks. We were both trying to get ashore, washed apart. We got someplace that was shallow, he stood up, and then he got knocked down. We washed apart. I was not really close to Mark once I was on the rock ledge.

“My PFD came up on me; it was wedged into a contorted position jammed up high around my head. My foul weather gear full of water. It was almost hard to walk once ashore, tired, I almost fell over from being jarred around. It was really hard to get up on the rocks. PFD, Harness inflated.

“I don’t know if tethers would have helped. If you were under the boat it might have crushed you. If on you were on the other side it might have been ok. This is not what the gear is supposed to help. Nick and Bryan probably have a better sense of this. I shut my eyes and held on to the lifelines. I could not hold on. The wave threw me hard against stanchion. Then sucked me to the other (port) side of boat and then off. I probably would not have ended up in the water with a tether. Not sure if I would have decided to stick with boat or pull a quick release on the tether. Being trapped under water is a worry as well.”

Other Comments from Jay Bradford:

“If we had not been there at that time. There seemed to be a wave there that was bigger than the rest of them. But that sort of thing can happen there, deep water shoaling to shallow, waves bouncing off the island. I have talked to people who seemed to think they had taken that line themselves.”

“Maybe a crotch strap might have helped, I don’t know. When you end up in breaking waves on the rocks it is hard. I can’t think of anything else, you get in the boat and brace yourself as you go up. Mark may have hit his head or taken a mouthful of water in the rocks. Bryan thought it was about it for him at the end trying to get up the rocks. It happened so fast. You can’t climb steep rocks. That is pretty much what I know.”

Jay was surprised how well the hull made it through. It did not fill with water. You could have stayed in it for a day or two on the island and been ok. As far as going up on rocks, the hull did not break. One hole on the back, one on the side pretty far down. The keel survived. The removal crew cut the rigging, stuffed it in the boat with all the sails and other stuff. ”

Nick Vos: Farallones Race - Low Speed Chase Survivor - Interview

Name: Nick Vos

Boat: Low Speed Chase

Date/Time: May 18 at 1145

Interviewers: Bill Barton, Sally Lindsay Honey, Bartz Schneider

Written by Bill Barton

Nick was crew aboard Low Speed Chase for the 2012 Farallones Race. He said Alan was the acting captain for the race, although Jay Bradford was listed as captain on the race entry form. Nick has been sailing for twenty years, started sailing offshore ten years ago. He did a Sydney Hobart as foredeck crew on a Volvo 60, has done a couple of Coastal Cups, a Spinnaker Cup, a few Farallones and one Pacific Cup with Jay Bradford on the boat. He has sailed 10-15,000 miles offshore. He has not attended any Safety At Sea seminars previously. He met Jay in 2007 when he was upgrading from a Santana 35 to Low Speed Chase, the Sydney 38. Alan may have done a couple of deliveries as captain of boats along the California coast. Jay did Newport Cabo race. Alan started a couple years ago on Low Speed Chase. Ron Young got Nick aboard the boat originally. Alexis had a couple hundred miles of offshore sailing; one Santa Cruz to Monterey, but no overnight passages.

He believes all crew were well rested and no health issues. Alexis and Elmer both had some trouble with seasickness during the race. Alan and Nick split one can of beer between themselves during the Farallones Race. They did not do any safety drills before the race, but they discussed conditions. They knew they had a good chance of winning in those conditions. He feels the lifelines were taught and in good condition. He said there was always one handheld VHF in the bag near the helm and a second in a cubby below.

Low Speed Chase started two hours (sic) late due to drifting past the line in light air and anchoring to wait for the breeze to fill in. It was warm waiting in the Bay, so Nick took layers off, had fleece and Musto HXP, offshore boots, two jackets, many layers of appropriate clothes. Buoy jacket (foam PFD), not like inflatable, less likely to have trouble with it inflating on the foredeck. Alex had auto inflate PFD with integral harness. Nick had a foredeck harness. There was an extra PFD West Marine 4000 on the boat. They always had probably eight orange PFDs in aft port berth, four to a zippered case (*Note: may not be Type 1 based on description*). Alex was wearing HL offshore gear, West Marine boots, thermals, gloves. Nick said they had probably eight or nine tethers aboard the boat.

At the actual start, everyone was relaxed, just wanting to sail around the islands. Nick started out doing jib trim. He would feed Alan information on what he saw of boats and conditions. Jordan starting doing foredeck while Nick was in the pit, but when they got out to the wind and changed from the #2 jib down to the #4, Jordan was struggling on the foredeck, not wearing foul weather gear, and getting wet and cold, so Nick took over the foredeck work. Nick did some time at the helm on the way out. Alan, Bryan, Jordan, Nick and Jay all took time at the helm, but Alan had the helm half the time. Maybe half way out, Alan went below to the Nav Station. Nick focused on making the boat go fast. Jay did not go below. Alan was doing the navigation.

Nick recalled a weather forecast with 12 – 14 foot swells at 13 seconds with 5-foot wind waves. Wind at 20-25 knots. They did not get weather forecasts after the start. He anticipated that the biggest waves would be maybe 15 to 16 feet if the waves and swells doubled up. He saw some

18-foot rollers on the way out, not unusual. Wind and waves seemed consistent with the forecast near the island. He recalls they did not see boats using spinnakers on the leg back to the Bay. They saw some boats going back after retiring and figured they must have broken gear. “We felt good, nothing to concern us on a beautiful day on ocean.”

The rounding strategy on Low Speed Chase was to lay the island after they peeled to the #4 jib. Alan had a waypoint off the island in his handheld GPS. Alan may have had a waypoint on the fixed GPS, Nick didn't know. Halfway across they could see the islands; they were trying to pinch up due to the effect of current. They rounded the first point on Southeast Farallon easily. and started to crack off for the second point. They eased the main and genoa and felt they were taking a similar line to other boats. Not concerned about being too close to

island. They were 100 to 200 yards from the break zone. There were other boats around them on similar tracks, all going around together. They were not concerned. They had the full main and #4 jib set. The helm was good and the boat was well balanced. Since Nick was doing foredeck, he was thinking about the steps for their spinnaker hoist or for poking out the jib, running through the steps for foredeck work.

At the time of the incident, Mark was on the rail at the shrouds, then Nick, Alexis, Elmer were on the rail aft of him, probably in that order, and Jay as well. Bryan was on the main, Jordan was down to leeward to crack the jib, and Alan was on helm. There were tethers for everyone on the boat, but not attached to their harnesses. The reef line was rigged on the main, but the helm was good with the full main. The companion way hatch was closed, but the washboards not in place. Only Nick remained on the boat throughout the incident, so had the clearest recall of what happened.

Nick saw a first roller that looked big about 30 yards before the one that rolled them. The next wave was fifteen seconds later. The boat turned into it and went perpendicular. They had 8 – 8.5 knots of boat speed. The wave broke just on the foredeck; there was 3-4 feet of water on the foredeck. Nick had been worried about Alex, because she was cold and seasick. He was holding on to her when the wave hit, but was bent sideways by the wave right around a stanchion; he heard his leg pop and believed it broke at that time. The wave stopped their momentum and pushed the boat backwards. They surfed backwards, then the boat pivoted counterclockwise, they were barrel rolled 120 – 130 degrees, and Alex slipped out of his hands. When the boat popped back up, Alan was not there; no one was on the helm, so the rudder may have turned. As the wave dissipated, he heard a scream and scanned the water for Alex, shouting “Alex! Alex!” Bryan was the only other one still on board. Alex was ten feet astern and giving him a thumbs up. Nick yelled to Alex, “Swim to the boat!” He sees Alan and Jordan hanging off the leeward lifelines near the wheel. He and Bryan go to leeward to help them back aboard. Bryan, who is farther aft, grabs Jordan and Nick grabs Alan, who is forward. Nick and Bryan had their backs to the waves. Nick grabbed Alan’s arms and tried to pull up, but he had nothing to hang on to since there was no harness to grab. The next wave hit and Nick was not sure how he stayed on board. Bryan was swept over. In the water, only Alan was still visible, struggling in the water, 10 – 15 feet astern. Nick looked for a line to throw to him, but couldn’t find anything and Alan disappeared.

Then Nick rode the boat into the beach; he was thrown around the cockpit on the way and would move to the high side after each wave. They flew downhill and he was thrown aft in waves, hitting the steering wheel. When the boat finally stopped on the island, Nick went below to make a Mayday call on the fixed VHF, before realizing it wouldn’t work without the mast. The boat was rocking around a lot and he was worried about staying aboard. He saw Alex and Alan to the east in the water. He tried running up the shore, sea lions were barking around him. Nick was blowing a PFD whistle to part the sea lions and get attention. He went east to a bay and saw Bryan exhausted, half in, half out of the water. He said, “Get going Bryan!” He encouraged Bryan and helped him; they both ventured further east looking for other crew. Bryan was 200 yards from boat where he came ashore, Jay 200 yards further. Mark was in the water below Jay, deceased. Nick took his jacket off thinking it was colorful and might help them get spotted, but then he gave it to Bryan to warm up.

Nick saw boats going by and wanted to signal them. So, he told Bryan to stay with Jay, watching him on the ledge, while he went back to the boat. Nick timed the waves, jumped aboard, and went below to get flares and the two handheld VHFs, one in cuddy below, the other on deck. He tried both radios while aboard with no success reaching other boats. A wave hit the boat as he was trying to get back on land. As he grabbed for a handhold, he dropped both VHFs and one bag of flares in the sea and they were lost. He set off one or two parachute flares and then returned to Bryan and Jay. He tossed Jay a “roadside stick flare” to use to help helicopter or rescuers spot him, then shot another parachute flare on the high flat area of the island. It worked perfectly. Next he set off a smoke flare near Jay. It was obvious Mark was deceased, face down in the water and beyond reach. Nick walked the perimeter on Maintop to look for others, and to shoot flares. He fired another smoke flare from hill and another parachute flare.

He started to see boats go back and forth around the corner of the island and was relieved to think they had now

been spotted and boats were tacking back and forth (Note: what Nick probably saw were some boats rounding in each direction. The investigators are not aware of other boats that altered course or stayed in the area.) He saw the research station. He knew there was a Cal 40 nearby and Temerity was behind them. Nick kept searching the coast line trying to find his other friends. He knew the Coast Guard would be coming because he saw boats tacking back and forth. Halfway up the mountain he stopped to empty his boots, which were still full of water. Now his leg started to hurt him, but he kept walking.

The Coast Guard arrived in about 50 minutes. Nick lit a “roadside flare” to help them spot the survivors. The helicopter hovered and sent down a rescue swimmer, Max, who said they thought they were looking for a different boat with fewer crew aboard. Nick told them Low Speed Chase had eight people. Soon an 87-foot cutter arrived. The rescue swimmer, Max, was talking to copter, relaying information. Bryan was the first up because of injury to his ribs. The Coast Guard said they could not get Jay with their equipment, but Nick was still concerned for Jay. The Coast Guard said the cutter had binoculars on him, and a second copter was coming. Max was firm about taking Nick up in the copter and back to SFO airport. Jay was picked up later by a Blackhawk helicopter by the Air National Guard.

Nick thinks he recalls seeing lights on the EPIRB while aboard Low Speed Chase on the rocks; he did not activate it. He recalled that Jordan had a PLB and the Coast Guard later said they got a hit off of Jordan’s PLB. The EPIRB was in a bracket aft of the nav station on the port side.

Other Comments from Nick:

“It was a freak accident. Maybe a series of limiting buoys around island would help keep boats off. The first wave pushed us into the break zone. We were a quarter mile off the island. If the wave hit us a mile offshore we would have had time to take action before the boat hit the island. If we had been tethered in, probably lives would have been saved. If we ended up on the other side, it may have led to crushing and death between the boat and rocks. The wave that hit us may have been 22 – 25 feet, double everything else out there. Mast and sail were not intact after hit. If we were further off we might have had time to react and save people.”

Would additional training help? “Maybe. Regardless of MOB training, there was no time once the wave hit. All MOB gear was washed overboard. Heaving line had been ripped off aft lifelines.” Nick thought about taking lines from the boat to rappel down to Jay, but decided it would not help.

Bryan Chong: Farallones Race - Low Speed Chase Survivor - Interview

Name: Bryan Chong

Boat: Low Speed Chase

Date/Time: May 18 at 1000

Interviewers: Bill Barton, Sally Lindsay Honey, Bartz Schneider

Written by Bill Barton

Bryan Chong was crew aboard Low Speed Race for the 2012 Farallones Race. He primarily worked on sail trim, but did take the helm on the way out to the island. Bryan first sailed at the Citadel in SC. He moved out to California and bought an old cruising boat 15 years ago, played around the Bay. Ten years ago started doing J/105 fleet racing. He spent eight years in the J/105 in Bay and did Lightbucket. Sailed with Jason Widley on Risk. He did foredeck work, main trim. Aboard Serena with Steve Stroube he did a Spinnaker Cup and Lightbucket as trimmer. This was his first race on Low Speed Chase. Alan Cahill was the best man at Bryan's wedding. Alan Cahill asked Bryan to join the crew for the race on Thursday before the start. Alan filed a crew list amendment. Alan wanted it to be right because there was a bit of a joke about how Low speed Chase did the 2011 Full Crew Farallones Race and finished but was disqualified for failing to register for the race and submit a crew list. Bryan had not taken any Safety At Sea courses.

He said Alan was captain aboard for the race. Jay depended on other more experienced people to get the boat ready and make decisions. Alan prepared the boat for the race. They did not have a separate tactician or navigator aboard. Alan considered it straight forward, get to the waypoint, not a tactically intense race. They did not discuss withdrawing on the way out to the island.

Elmer was most inexperienced in the crew, he had taken a couple sailing classes in Berkley. It was Elmer's first ocean race. Alan Cahill had done a couple TransPacs, sailed on Geronimo to southern California, sailed with Steve Stroube in a Coastal Cup. Alan had done some Farr 40 sailing. Alan takes care of a lot of boats. He did not think Alan had sailed in a Sydney Hobart. Bryan thought Alan had done 10 to 15 Farallones races, mostly as paid crew. Bryan felt Alan had some command experience in coastal boat deliveries, but not in races. Alexis was fairly inexperienced. Mark Kasanin was a close friend of Bryan's; they sailed together in Friday night races, partnered in dinghy races. Mark was more experienced than Bryan. Mark was not big on having done lots of offshore races.

The entire crew seemed well rested the morning of the race. No signs of illness or other physiological issues among crew. Elmer and Alexis both had some trouble with seasickness during the race and Bryan believed they both took over-the-counter Dramamine or similar medication. Elmer was ok after the pill.

At the start Mark wore an inflatable with harness that was his own gear. Elmer wore one of the boat's inflatables; it had white tape around the bottom of each side to hold in manual pulls which may have been put inside the outer shell to prevent accidental pull. Elmer added a clothing layer, foulies added and running shoes. Alexis had an inflatable with harness, full foul weather, and rubber boots. Jordan had full foul weather gear, navy blue foam vest, and no harness. Jay had full weather gear, West Marine 4000 inflatable with integrated harness. Bryan, had West Marine 4000, auto-inflate, manual tab tucked away inside outer shell to prevent unintended inflation. He found it hard to get at the manual pull a couple days later, difficult to separate Velcro and rummage inside to find it. Would have been hard to get pull out when he had been in the water at the Farallones. Bryan had a Wichard tether attached with quick release at chest. A lanyard with beads would have helped if he needed to actually pull the quick release when in the water. Alan Cahill had a fanny pack; it looked as if it never inflated when he went in the water. The fanny pack looked like it was from the Non Sequitor program held in the Bay eight or nine years ago. Bryan ever saw it inflate when Alan was beside the boat in the water. Nick had a yellow kayak style foam vest, no harness or tether.

Bryan had a spare inflatable PFD onboard that inflated in its bag, he realized when he later collected his gear from the boat. Bryan had not inspected his PFD in the last year. He was not sure about the others on the boat. Bryan's did auto inflate perfectly when he went in the water. The boat had another three inflatables aboard below. There were definitely a few other tethers; some were in mesh bags in cockpit before the race on purpose.

However, use of tethers was not discussed aboard Low Speed Chase at any point. No safety drills were done on the boat prior to the start. They did have jacklines rigged.

Bryan commented that he would have rather been hanging off the boat as she went ashore than his 15 minutes in water with rocks. It was like a washing machine with rocks. Each wave pinned you down. Lots of foam, you feel your head is in the water. You only got a few times between waves for a few seconds to breathe at best. Bryan had never tried jumping in a pool with a PFD to see what it really does or feels like on you. He would urge in-the-water training. "A hundred times over" he would want a crotch strap; he always had to push the PFD down but needed his hands to swim or crawl out.

Halfway across to the Farallones it was a nice day, wave action not too sloppy, a big wind a few days before had passed through. Bryan thought it would be a great ride. Saw 10-12 foot seas with bigger ones at 15-feet. At the Farallones, there was a stronger wind and bigger waves than on the way out. The wind felt stronger at the Farallones, low 20s maybe.

We had laid the island from Pt. Bonita. It was Bryan's first Farallones. As we start rounding and passed the first point on Southeast Farallon, we cracked off. Bryan looked down to leeward and saw a break zone. Maybe Alan intended to hit the second point on Maintop harder at first so we cracked off, then we trimmed back in a little on main. There were a couple large waves on the way to the next point on Maintop and as we crossed onto where the shoal is we saw waves starting, less consistent wave forms. They were coming from different angles.

Alan had not viewed GPS handheld since before rounding. Alan eyeballed the rounding looking at the island and surf, making decisions on their course. Jay was not involved. Alan was on the wheel for the rounding. The rounding strategy was to enter waypoint near the island as a target from when you leave the Gate. Strategy was all in Alan's head. We were clearly inside two other boats when rounding. One boat was behind and outside, and another ahead, a third boat was behind about on the same line pretty far back. Low Speed Chase was one of last to leave the Gate. Depth did not appear to be a factor in strategy.

At the time of rounding Maintop Island Bryan would have said something if they had been half that distance off the island; but nobody was scared, there was no argument where they were. The boat was under full main and #4 genoa. No washboards were in the companionway, but the hatch was slid shut. The handheld VHF used to check in for the start was probably in a mesh bag in the cockpit.

About 30 seconds before the wave that rolled Low Speed Chase, Bryan remembers a big wave broke astern. Next came the wave that caused the accident. The wave looked like a huge swell approaching; Bryan thought, "Wow! That is a huge swell, like at Pt. Conception." It flattened and changed as it approached. Alan turned the boat into it. It arrived at the boat at the moment it was breaking. The boat was going up the wave. Alan said, "Oh shit." The boat headed toward vertical, it was a 38-foot boat going up the side of the wave; we were not near being able to go over.

At the time the wave hit Bryan was trimming the main, Alan was at the wheel, the rest of the crew were on the starboard (windward) rail. Bryan put his arm around the lifelines; one of his hands grabbed the other wrist. He said to himself, "Don't let go." He put his head down, lost view. The boat started to surf backwards down the wave after not going over it; the boat rotated counter clockwise back to course, then rolled us. "I felt like I was underwater." He is unsure if it was a full roll or not. At some point he was clearly underwater. The boat came back up; he looked at water clearing off the boat. To him it looked like a different boat, all the crew was gone except Nick and Bryan. People fell over the port side of the boat; Alexis, Alan and Jordan could be seen on that side.

He does not remember seeing if the mast was snapped, but did see lose shrouds and sails in tears and figures probably the mast did snap. Bryan looked over on the port side and saw Jordan and Alan were grasping the boat

or lifelines. Bryan grabbed both and pulled, but they were too much. Nick then saw Alexis in the water. Bryan had Alan in his right hand, Jordan in his left. Nick then took hold of Alan. Bryan tried to pull Jordan aboard and could not get him, so he tried to walk him to the back of boat and the ladder. Bryan was standing up pulling Jordan aft to the back of the boat when the second wave came. With the wave coming at their backs, Bryan and Nick did not see it coming. The wave hit Bryan from behind; it felt similar to having the wind knocked out of you by force. Now Bryan was in the water, washed overboard. He lost track of time, being pinned down by surf; he remembers coming up at one point, seeing the boat, Nick aboard, looking around for something to throw. Bryan later felt they needed a better way to attach safety gear to the boat to keep it there when such a wave hits, nothing was left. Bryan had seen a life ring floating in the water earlier between waves. He could see the boat higher up looking at her transom, moving much faster than himself towards shore. The boat disappeared. Bryan did not see the others after the first wave.

Bryan spent some time getting in to rocks; but, most of his time was trying to get out on the rocks. “It was one step forward two back, waves hit and pulled me back; it was a helpless feeling: trying to grab slippery rocks covered with growth and mussels, I was losing my breath. It was as if the world only had two colors, dark and light, rocks and water.” He found himself taking gulps of water accidentally. He tried a strategy of turning and looking at waves, but that only gave him a face full of water.

Bryan had his PFD but still worried about drowning. At one point he gave up. He thought, “I can’t be held under again. I realize this is how I am going to go.” He thought only of his wife and kid, nothing else, Camille and River. He was resigned, exhausted. He was not cold because he was so “jacked.” He thought about kicking off his boots. Finally he lunged on and climbed up on a rock six inches out of water; a wave pushed him further back on the rock. He could climb up to another foot above the water. Then Bryan heard Nick, Bryan had washed ashore near the boat. He was being moved away from boat down shore with each attempt he made to get on the island.

Nick had done radio calls and was now looking for people. Nick said, “You have to get out of there!” Bryan would go to stand up and his legs would collapse; he crawled on hands and knees to higher, drier rocks. Nick helped him. Nick returned to the boat for flares while Bryan rested briefly. Nick got a handheld VHF on the boat and tried calling. The boat was getting knocked around by the surf. When Nick was when trying to get back off the boat, a wave knocked the vessel and he fell off the boat. Bryan thought Nick may have broken his leg in the fall. (Nick believes his leg was actually fractured when the very first wave hit the boat.) Nick took off his bright jacket and laid it out for visibility. Bryan, now freezing cold, shook out the jacket and put it on, wanting to keep warm.

Bryan started looking for others with Nick. They found Jay trapped in the rocks in the head of the cove. Jay was on a rock in the crook of the bay. They checked more of the shoreline. Nick walked to the backside of Maintop Island. Jay stayed on the long rock ledge until picked up later by helicopter. There was no way to get from the ledge to the top of the cliff above him where Bryan and Jay were. Mark missed being able to climb out on the lower end of the sloping ledge where Jay was. Mark was pushed back by waves. It looked as if Jay was using his tether to try and reach Mark. Mark was deceased and floated face down. Mark had his inflatable PFD on at first, when they looked again after he was floating face down the PFD was no longer on him, it had washed off. Alan’s body was near the ledge, already deceased, and floated away. Nick popped a few flares. They took turns watching Jay. Alan’s PFD had not inflated. Jay’s and Bryan’s PFDs did auto inflate. They felt sure there were no other crew about on the shore of the island after checking and patrolling. Elmer was not seen from the time of the first wave. Bryan had bruises on his arms, fractured ribs, bruised legs, and scrapes on his left side.

Other Comments:

Bryan feels staying on the boat would not be a bad thing. “If they had been clipped in, the majority would have been ok, but bruised. It is easier to help somebody if you are tethered to keep yourself safe.” He also commented that if a sailor over the side is wearing a PFD/Harness, it gives you something easier to grab to pull

them aboard, than trying to grab just foul weather gear. “Percentage wise, coming off the boat into the water was not a good thing.”

Bryan wants to see it not happen again. “If I had known a wave like that could break that far out, I might have thought about it differently.” Bryan does not want lots more burdensome rules. “We need a cultural shift in skippers or experienced people. Add MOB drill and tethering strategies should be discussed. Start a dialog. People should discuss the pros and cons of life jackets. Everybody, crew included, need to think about life jackets. People rely on the skipper, but all need to take responsibility for safety and PFDs. All sailors should take some responsibility. We view safety as an annoying checklist in the sailing community. They were focused on the break zone during the rounding. Now he knows there is a bigger set of waves that can come.

Bryan referred to three groups of sailors: people who really know and study all aspects; people who know how to sail a boat fast; people new to it who might take it up.

The Boat Now:

Air lift took port stanchions off, port jackline off, Bryan took starboard jackline off boat later. Port transom had two foot wide hole. Rudder broke about a foot or two down. Lower portion of keel and bulb were cut off after she was brought ashore.

Bryan Chong is a surviving crew member of the Sydney 38 Low Speed Chase which lost the lives of five people during the disastrous Full Crew Farallones Race in San Francisco. Here, he tells his story. (Originally printed in Latitude 38)

A Letter to the Community:

This letter goes out to a devastated sailing community still confused about the events surrounding the 2012 Full Crew Farallones Race. There have been inaccuracies in the media, mostly stemming from the survivors’ silence as James (“Jay”), Nick and I are still reeling from tragedy and the loss of close friends and loved ones. I’ve chosen to use Sailing Anarchy, Seahorse, Latitude38 and Scuttlebutt for distributing this story because they’re of a kindred spirit and were the favorites amongst the crew of Low Speed Chase and those who already know the answer to the question, “Why would you sail in the ocean on a windy day with big swells?”

I’ve also included the Marin Independent Journal and The Tiburon Ark, as they’re the hometown newspapers in an area teeming with sailors. Many sailors relocate from around the world to Marin and the Tiburon Peninsula in order to live in proximity to the world’s best sailing. Alan Cahill moved from Cork, Ireland to race sailboats professionally in the Bay Area and the Pacific Ocean. He was the best man in our wedding and will be dearly missed while I journey this planet.

This letter does not contain every detail, but my account should provide a basic understanding of our day on the water and what happened after the first wave hit our boat. It is meant both to illustrate how things can look normal until one event changes everything and to begin to address what we can learn. It’s my hope and intention that it will spark a wider dialogue within the sailing community about safety standards and, more



Farallones researcher Sophie Webb captured this eerie image of the stricken sloop while rescue operations were in progress.
© 2012 Sophie Webb

importantly, safety practices.

One of only three survivors, avid racer Bryan Chong was aft, trimming the main, when tragedy struck the Sydney 38 Low Speed Chase.

Why do we sail?

A sailor's mindset is no different from that of any other athlete who chooses to participate in a sport that has some risk. It's a healthy addiction. Despite the highly publicized deaths of Sonny Bono and Michael Kennedy, skiers all over the world continue to hit the slopes each winter. Sitting on the couch is safer than ripping down a slope, but the reward makes the risk worthwhile.

Next, we should all agree there are a wide variety of interests within the sailing community. Some sailors prefer racing to cruising, small boats to big, or lakes to oceans. We all make personal decisions about the risks we're willing to take to enjoy our own brand of sailing.

Naturally, I have personal preferences. I most enjoy one-design and ocean racing. I generally consider sailing to be at its finest when you're coming around a mark alongside 20 identical boats, or when you're in the ocean with a kite up on a windy day, the wave action is perfect and you're surfing downwind at speeds usually reserved for powerboats. I was a guest crewmember on Low Speed Chase and I got the sense the others were seeking the same downhill ride back from the Farallones as I was. There were eight sailors on board: one professional, six experienced sailors and one sailor excited for his first ocean race.

The Start Line

It's Saturday April 14, 2012 around 8:30 in the morning. Seven of us are aboard Low Speed Chase as we leave the San Francisco Yacht Club in Belvedere. We head across the bay and swing through the Golden Gate Yacht Club in San Francisco, where Jay hops on from the docks. We motor to the St. Francis race deck start line. Alan grabs the handheld and with the brevity learned from years of flying small planes says, in a heavy Irish accent, "Farallon Race Committee, Sydney 38 Low Speed Chase 38009. Checking in. 8 souls on board." No response. He repeats and the voice on the receiver sounds back, "Confirmed, Low Speed Chase. Thank you."

We raise our sails as we traverse the starting area, checking currents and winds and working out a starting strategy. Meanwhile, the crew double-checks sails, lines, safety equipment, and clothing layers. Today our starting strategy, unlike buoy racing in the bay, is simple: avoid an over-early penalty. This is especially true given the light winds and ebb tide.

A few minutes before the start, someone notices that the reef line for the main isn't tied. Our new Quantum sails were delivered only a couple of days before. They still have that stiff new-sail feel that never lasts long enough. It's going to be a windy day and we need to rig it before we get out in the ocean. I have a harness in my sail bag but Nick is already wearing his. He clips into a halyard and 5 feet up he goes to tie on the line. Alexis grabs his foot to guide him down the boom, and after a few minutes we are ready to get underway.

"Boom!" First Gun.

We are well behind the start line but as the countdown continues we realize our distraction has taken us slightly outside the starting box. The air is still and we're trying to trim our sails to squeeze everything we can from one knot of wind.

The start gun goes off and we're still fighting to get inside the box. Ebb is not our friend today and we soon find that we've drifted past the start line without going through the designated gate, so we'll have to backtrack for a proper start. The pressure seems to be hiding just under the Golden Gate Bridge, almost like it's mocking us. It kind of reminds me of Friday night races in Belvedere Cove when the wind shuts down right before the start but continues to tease you from out in the bay.

Already critical of our "start", we anxiously wait for the wind to fill so we can make it back to the line. "Should we pop the kite?" gets floated for a second but it's killed when the wind dies to nothing. We're floating backwards toward the bridge and our drift takes us abeam of Anita Rock. We decide to anchor to prevent any

more backwards “progress”. Jay pulls the anchor from down below and Jordan heaves it into the bay from the bow. Other boats that have started the race now begin to sail – rather, float – past us. A few find humor in our plight and aren’t shy to share. Even Berkeley, a regular crew member on Low Speed Chase who couldn’t make the race due to an injury texts “nice start...” to Alexis from the shore.

Finally, the wind begins to fill in behind us. Dislodging the anchor is another challenge but with a winch, a halyard, and some muscle from Marc, we bring it up it from the bottom of the bay.

By the time we make it across the start line our botched start has cost us over an hour. Our objective for the race has changed now, and the only victory we’re hoping for is to avoid the notorious DFL.

The Uphill Slog

Non-sailors often ask what it’s like to sail in the ocean, and what’s the appeal. I usually compare it to backcountry skiing or mountain biking. The reward is in the descent. You work through the uphill portion in exchange for the downwind ride when your boat flattens, apparent wind drops to a light breeze and, on the right day, your boat skips along as it planes and surfs down the front side of swells.

As we sail under the Golden Gate Bridge, Peter Lyons clicks a picture from the shore. We tack a few times and set up a starboard lay-line that we will stay on for the rest of the day as we head out to the Farallon Islands. The skies are clear and we’re seeing 20-23 knots. It’s always been hard for me to gauge swell height from the water. Each swell has its own personality. To me it seems the seas are 10-12 feet with larger sets around 15 feet.

The upwind leg is uneventful and we fill the quiet moments with our usual banter. We tease Elmer about his difficulty emptying his bladder. Jordan snaps at Alan for being Alan. All in all, it’s turning out to be a beautiful day on the ocean with conditions as expected. The wind and swells are big but consistent in speed and direction. Nick, Alan, Jordan, Jay and I all take turns on the wheel, maintaining between 7.5 to 8.5 knots of upwind boat-speed.

The mood on the boat is relaxed. We chat about which of our three kites will be safest for the ride home. We’ve accepted our place in the back of the pack now, so there is no need to risk equipment or safety. Our mindset is definitely not aggressive. We peeled to our smallest jib just outside the bridge and there’s no need to reef the main since we aren’t being overpowered.

We set up earlier in the day for a port rounding or “taking it from the top” as I’d heard it referenced amongst sailing buddies. I’ve done a number of day-long ocean races to Monterey, Half Moon Bay and buoys like the Lightbucket. This is my first race to the Farallones - a race that I’ve wanted to do for years. My anticipation heightens as our boat approaches the islands.

Around the Island

The Farallon Islands have a rugged, haunting beauty about them but there’s no time for sightseeing as we approach. The waves and wind have steadily built and we start seeing scattered white caps. As the conditions intensify, I’m on the main and Alan – by far the best driver with the most ocean experience – is on the wheel. We soon approach the first rocky point on the northeast corner of the island. The swells are much larger and the wind has been building. We saw another boat pass a few minutes earlier on an outside line. Behind us, one boat is outside of us and another appears to be on our same line.

There’s a YouTube video titled “Crewed Farallones April 14, 2012” showing the Santa Cruz 50, Deception, and several other boats rounding the island. They would have rounded about an hour before us in similar, if not slightly lighter, conditions. The video shows the difference in swell sizes before, during and after rounding the island. Michael Moradzadeh, who thankfully radioed in the initial distress call, notes that the video doesn’t do justice to the intensity of the day. I agree, but it does provide a good baseline for those who didn’t make the race. As I watch the video, Deception’s route feels eerily similar to our own. In fact, when we passed the first point I think we were just slightly outside of their line.

The South Farallones consist of two primary islands, which together form a crescent with its arms toward the north. Between the two northern points we begin to crack off the sails into a close reach as we head toward the next point. The boat in the “Crewed Farallones” video had about the same amount of sail trim but it appears they turned after we did. Our route takes us inside the line of Deception and closer to the island.

Fellow sailors can relate to trimming sails during intense racing or weather conditions. We assimilate data in a series of snapshots taken from within the boat and across the race course. I suspect that's the reason sailors show up to race protest rooms with 5 different accounts of an incident that happened at a speed no faster than a run.

I've been asked by investigators, friends and family just how close we were to the rocky coastline. Truthfully, this is one of the most difficult questions to answer; my focus was almost purely on the distance to the beginning of the break zone. Staying away from the rocks was a secondary concern to staying away from the breakers - an ocean feature that has scared me since long before this weekend. Swells are fine. Breakers aren't. As we approach the second point I estimate we're inside of 10 boat lengths - which is 128 yards on a Sydney 38 - from the beginning of the break zone. Our distance looks safe and no one on the boat comments. I catch a glance of clear swells off the port side of the boat between the break zone and us. We keep sailing. The boat is heeled toward the island. Alan is driving, I'm trimming main, and everyone else is on the rail. Then, we come across the largest swell we've seen all day. It begins to crest but we pass over it before it breaks. Thirty seconds later, we will not have such luck.

The Wave

I see another wave approaching in the distance. It's coming from the same direction as the other swells but it's massive. I've seen large waves before but this is unlike anything I've ever seen outside of big-wave surf videos. As the wave approaches it begins to face up, its front flattening as it crests. By the time our boat meets it, there's no escape route. Alan steers the boat into the wave and the bow of Low Speed Chase ascends the breaking wave, which seconds sooner would have been a giant swell and seconds later would have already broken. Instead, we're heading into a crashing wall of water with 9-10 knots of boat-speed and it breaks directly on us. I lock my right arm to the bottom lifeline and brace for the impact. The last thing I see is the boat tipping toward vertical with a band of water still above it. A single thought races through my head: "This is going to be bad."

After the Impact

I was underwater until the boat righted itself. Confused and disoriented I looked around while water cleared off the deck. Nick and I were the only ones still on the boat. The sails were shredded, the mast snapped and every flotation device had been ripped off. We immediately began to try pulling our crewmembers back into the boat but a second wave hit us from behind. This one ripped me off the boat and into the break zone. Nick barely managed to stay aboard as the boat was tossed by the breakers onto the rocks.

I couldn't tell if I was in the water for a minute or an hour, but according to Nick it was about 15 minutes. People have asked me if I swam for shore. The best way to describe the water in the break zone is a washing machine filled with boulders. You don't really swim. The water took me where it wanted to take me, and when I was finally able to climb from the surf onto low rocks I heard Nick shouting from the distance for me to get to higher ground. Together we located Jay further down the shoreline. He was out of the surf but trapped on a rock surrounded by cliffs. From what we could see, nobody else had been able to climb to safety.

As for what happened in that first wave, my head was down and I initially thought we might have pitch-poled. Nick, who broke his leg while it was wrapped around a stanchion and had a better view, tells me the boat surfed backwards with the wave for a stretch then rotated 90 degrees counter-clockwise before the wave finally barrel rolled it. This seems logical and explains how we ended up pointed back the same direction we started.

The US Coast Guard and Air National Guard performed the rescue operation with a level of professionalism that reinforces their sterling reputation for assistance during these types of emergencies. We're incredibly fortunate to have these resources available in our country. If we had been in another ocean off another coast then Jay, Nick and I may not have been rescued.

Correcting the News

There have been various inaccuracies in the news of what happened that Saturday. I believe they stem mostly from misinterpreted information. For example, many sources reported that we attempted to turn the boat around to help other crewmembers after the first wave hit. This is not accurate. I believe our statement

immediately upon being rescued that, “we turned around [while on the boat] to get people out of the water” somehow became “we turned the boat around to get people out of the water”.

Additionally, some assumed Jay, the boat’s owner, was driving. While one person can be the owner, captain, skipper and driver, this is often not the case. Jay loves sailing but uses professionals like Alan to coordinate his sailing program. This had always been the case with Low Speed Chase and it was no different this day.

Reflections

The sailing community might want to know what we could have done differently that day. It all really centers on a broader commitment to safety – preparation that happens before you get on the boat to race. When sailors “talk sailing” it’s usually about winds, currents, tactics, rules or the events of the day – not about safety. I almost never hear conversations about the benefits of different life jacket models, pros and cons of tethers or about practicing man-overboard drills before a race.

That day we had all the mandatory safety equipment including two installed jack lines. Everyone was wearing life jackets and there were 8 tethers on the boat – mine around my neck. Unfortunately, none of us were clipped in when the wave hit. I can’t speak for other ocean sailors, but I’d reached a level of comfort where I’d only tether at night, when using the head off the back of the boat, or when the conditions were really wild. It’s simply a bad habit that formed due to a false sense of security in the ocean. “Besides,” I’d say to myself, “I can just clip in when something bad is about to happen...”

It’s obvious to me now that I should have been clipped into the boat at every possible opportunity.

Nevertheless, arguments for mobility and racing effectiveness over safety are not lost on me. Some safety measures can indeed limit maneuvers, but if you’re going to spend an hour driving, trimming or hiking in the same spot, why not clip in? Additionally, there are legitimate concerns about being crushed by the boat. Those 15 minutes in the water were the absolute scariest in my life. The boat was the place to be - inside or out. Until the accident, I believed that to tether or not was a personal choice. But now, my thinking extends beyond the safety of an individual to that of the team as a whole. Here’s the logic: If I’d been tethered when the first wave hit, I would have needed to unclip to help the others who were overboard, then I’d have been hit by the second wave and still ended up in the water. Crews need to talk as a team about tethering strategies. One person overboard puts the entire crew at risk, as others might need to unclip to quickly maneuver the boat back to their location.

I truly consider myself lucky to have a second chance at life with my wife and 8-week-old son. Looking back, there were a number of factors that might have helped me survive in those waters. After years on the foredeck, I wear shin guards, ankle pads, neoprene kneepads, full-finger gloves, Dubarry boots, full foul-weather gear and no cotton fabrics. I also wear my auto inflate personal floatation device (PFD) for ocean races. Additionally, the well-used gym membership my wife got me early last year was invaluable. Luck was truly on my side but I also think that maybe I left the door open for it.

There are other lessons that can and should be learned from the incident. My auto-inflate suspenders inflated as designed. However, my manual override cord was tucked away and unreachable - a practice amongst sailors who are worried about an accidental opening. A PFD with a crotch strap would have been far better. It would have held the device down and freed up my hands to climb out of the water or swim. My built-in PFD harness was also too loose and I was concerned about it slipping off. A rash guard would have been a worthwhile layer for warmth. All flotation devices attached to the back of the boat were ripped off by the first large wave. And it’s important to consider the advantages and disadvantages of each PFD and make sure it matches the conditions. Safety lessons shouldn’t have to be learned the hard way.

Hopefully this incident will spur a wider discussion on sailboat safety. However, the biggest lesson I learned that day wasn’t about any piece of equipment. It was about taking personal responsibility for my own safety. Our EPIRB, a water-activated GPS tracking device, fortunately went off as intended, but who double-checked the batteries that morning? It wasn’t me and I didn’t ask who did.

It’s my wish that no crew or community will ever go through what we’ve endured from this tragic accident. The memorial flotilla on Saturday for my lost crewmates was by far the most touching memorial I’ve ever seen. I watched from the SFYC host boat as over a hundred sailboats and powerboats, many filled to capacity, came together on the water in a display of something beautiful and heartwarming in the midst of a week filled with terrible pain and sorrow.

At a service this weekend, I heard a quote from a 1962 speech by John F. Kennedy to America's Cup competitors that, in my mind, captures the essence of our fascination with the sea:

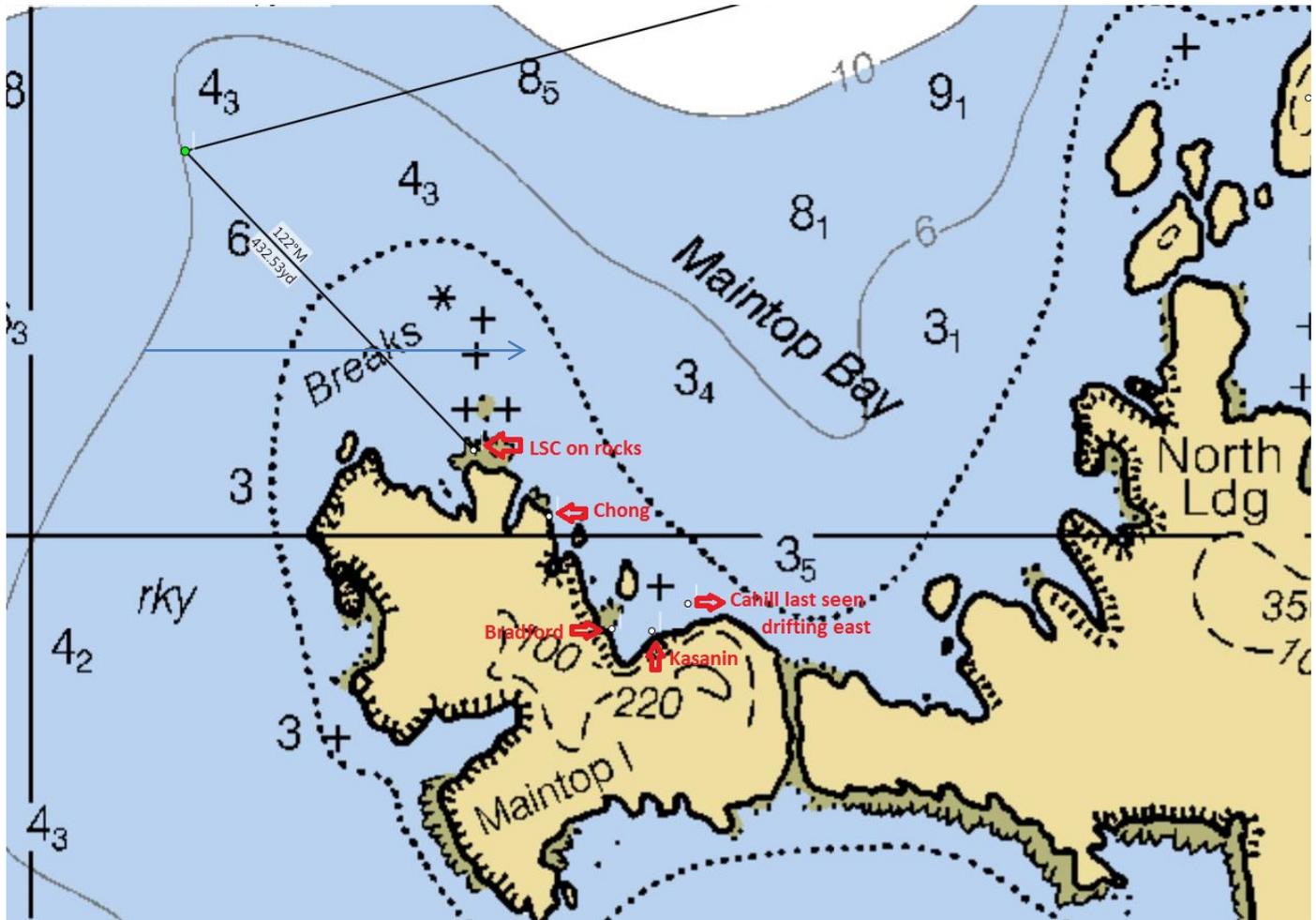
"I really don't know why it is that all of us are so committed to the sea, except I think it is because in addition to the fact that the sea changes and the light changes, and ships change, it is because we all came from the sea. And it is an interesting biological fact that all of us have in our veins the exact same percentage of salt in our blood that exists in the ocean, and, therefore, we have salt in our blood, in our sweat, in our tears. We are tied to the ocean. And when we go back to the sea, whether it is to sail or to watch it we are going back from whence we came."

Alan, Marc, Jordan, Alexis and Elmer. Keep your rig tuned, your kite full and your foulies dry. We'll one day finish our race together.

— Bryan Chong

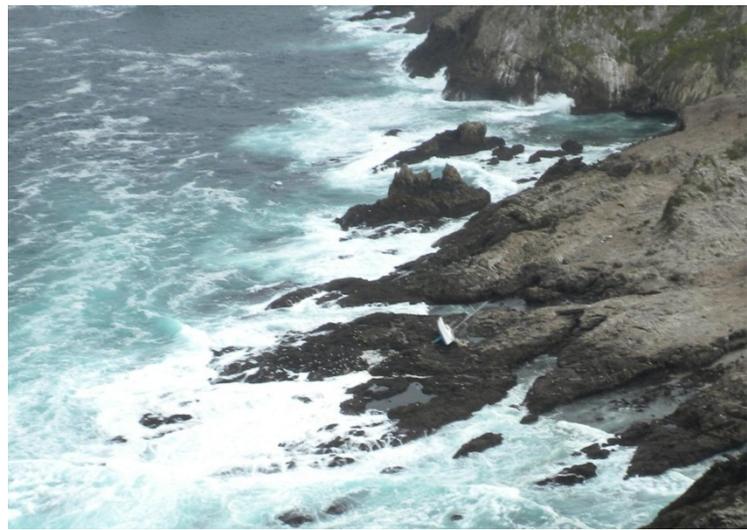
Saturday Crew on Sydney 38 Low Speed Chase

Appendix E: Locations on Island – Low Speed Chase Survivor Locations Following Capsize, positions from Bryan Chong



Low Speed Chase on Maintop Island viewed across Maintop Bay, looking northwest, showing inner bays.

Low Speed Chase on Maintop Island point, showing coast where survivors came ashore.



Appendix F: Search and Rescue, Recovery

1. Coast Guard/ANG activity timeline & description, recorded during personal interview with Bartz Schneider and Sally Lindsay Honey, and corroborated by data sent on June 21, 2012 in response to FOIA number 2012-2261.

Time line of the action taken by the Coast Guard related to the LSC incident on the afternoon of 14 April.
Times are in Zulu, subtract 7 hours for PDT.

2140	Notification of white vessel with white sails on the rocks on SE of Farallones made by Made Easy. CG diverted airborne helo
2143	Diverted helo en route to Farallones
2144	Broadcast issued
2151	s/v Green Buffalo has visual of a/s on the rocks. High surf, no people sighted.
2157	Farallon Fish and Wildlife reported visual of s/v on rocks, stuck in surf. 1 person on board.
2209	CG obtained correct phone # for race coordinator.
2211	Farallon Fish & Wildlife report 2 persons on shore, 1 flare launched.
2215	Comms Center (SCC) got names of all on board vessel Low Speed Chase from Marine Event Permit
2216	Motor lifeboat underway from CG Golden Gate
2218	Initial briefing SSF: s/v on SE side of Farallones
2219	CG launched, delayed, awaiting instructions
2220	EPIRB signal came in
2221	Helo safe, ready to launch
2222	CG requests 2 additional helos from ANG 129th
2236	Far. Fish & Wildlife reports 3 persons on shore
2236	Helo on scene at Farallon Islands. Visual on white vessel on rocks.
2253	CG cutter Sockeye 45 minutes away
2259	Helo – 3 people on rocks, one in water. Lowering swimmer.
2309	Helo has lowered swimmer, possibly 5 PIW (persons in water), plus 2 on rocks & 1 in water
2339	Permission to work with 129 th ANG
2341	Mission number
2345	Sockeye on scene & assigned command role. 2 persons on shore, 1 trapped on rocks.
2346	2 nd CG helo will be ready at 1800 (PDT – time now is 1546 PDT)
2347	Helo begins hoist of 1 st person.
2348	ANG airborne en route to Farallones
2350	ETA 15 minutes
2354	Briefed
0000	Helo returning with 2 survivors (to SFO), 1 still on rocks
0003	Helo: vessel on rocks is Low Speed Chase. 5 piw's & 1 person on rocks remain. First information from the boat (Sockeye?)
0007	Jolly 91 & 92 (ANG helos) on scene. One picking up person on rocks, other located 2 piw's
0014	Sockeye en route to EPIRB location: 37 41.8 123 05.2
0016	Jolly 91 recovered one person off rocks
0018	Sockeye confirms 3 survivors, 1 dead on arrival
0020	Motor life boat on scene
0035	Motor life boat departed scene
0035	Response resource – interviewed survivors, verified crew
0044	SCC (station command center) updated Sockeye: 8 persons on crew, 1 not listed
0100	SCC started pointing interested parties to the PRO
0103	Another CG lifeboat launched
0104	Temerity contacted by VTS: “not in distress”

0108	Another helo (2 nd CG) en route to search area
0130	Jolly 91 deployed swimmer into vessel. No persons in vessel or in water.
0139	Jolly 91 en route SFO with one survivor
0211	First search pattern gave negative results. Starting second search pattern.
0214	CG requested support of 129 th until sunset.
0222	Jolly 92 at SFO with deceased, name unconfirmed
0235	129 th returning to Base
0237	One CG helo back to re-fuel
0241	SAR controller creating another search pattern. CG cutter Pike will be ready in AM to be underway.
0247	POC identified
0247	Next search patterns
0258	Request CG cutter Aspen underway (225' buoy tender). Command control on scene.
0300	National Command Center, Wash DC briefed
0310	Sockeye directions for overnight searching
0355	Motor lifeboat returned to base due to weather
0400	Notified CA Emergency Management
0422	James Bradford released from hospital, staying in hotel (named)
0423	Briefed Aspen, Pike, SSF & 129 th about first light search efforts
0436	Pete, Far. Fish & Wildlife reports weak light (moon only) in area on LSC
0447	Seas 16', patchy fog, Sockeye returning to base, fatigue. C130 requested
0450	Airstation bagged flights; couldn't see, low ceiling
0458	Bradford, the 'master', briefed Heckendorn: his passengers wearing light foul weather gear.
0556	Helo completed search pattern
0624	Helo sortie ended
0637	Motor lifeboat sortie ended
0638	SCC contacted Golden Gate re: crew fatigue – underway?
0811	SCC – Air Station Command: weather too bad to continue now. Plans for first light: Aspen, Pike, 1 motor lifeboat, C130, 1-2 CG helos, 2 ANG 129 th helos
15 th Apr-1227	C130 launched
1230	"12 mile unrestricted visibility"
1722	Capt. Stowe briefed by Mr Fielding, SF coroner, Marc Kasanin ID'ed. in contact with Marc's mother and brother
2037	Capt. Stowe began calling families to inform them the CG would be suspending the search.
2039	Sighting of "gumpy" (immersion) suit by Pike. Looked like it had been in the water a long time, unrelated.
0303	Status update on confirmation of deceased victim from SF coroner's office.
0304	CG officially suspended the active search.
	Peter Baldwin said he had video of event and wanted to turn it over to authorities (Redhead)
21/2224	Body found 500 m off Main Top Bay. Male, medium build, black jeans, in surf. Not able to recover then. (Would be Jordan)
2May12	Found Elmer. Recovered from the Farallones.

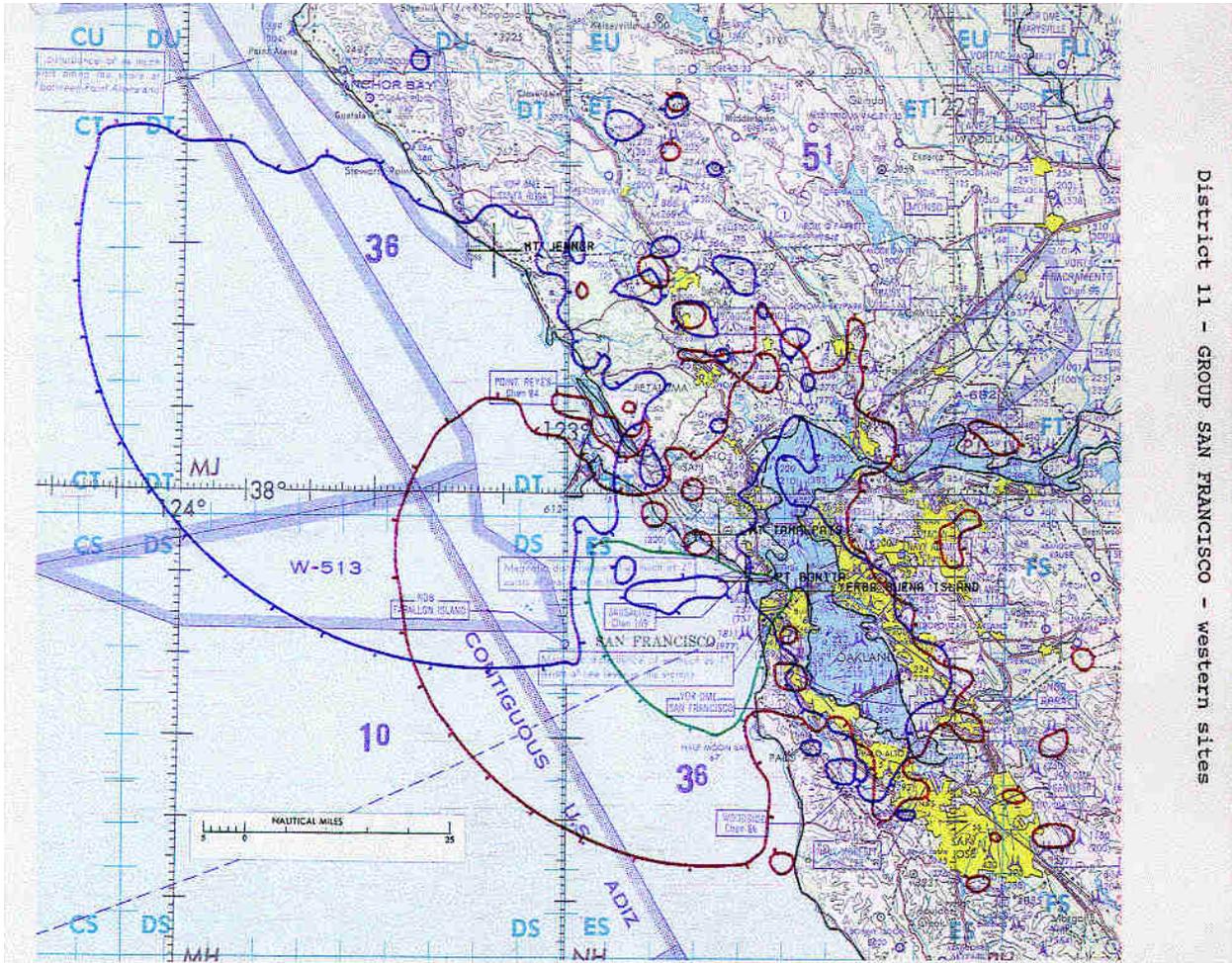
2. **EPIRB transmissions from Low Speed Chase:** The EPIRB was an ACR Rapid Fix 406 Model, which could be deployed manually or automatically water activated. The model has an optional GPS interface through an optical infrared diode, but this was not enabled and no GPS locations were received during the incident.

The Following Alert information was transmitted:

- All 11 relevant alert messages sent out from the SARSAT US Mission Control Center are attached. All of these messages were sent to the US Coast Guard PACAREA. All times in these messages are Universal Time Coordinated or UTC which is Greenwich Mean Time.
- Message 1 had a detection time of 14 2159 April. No location was available for this alert.
- Message 2 had a detection time of 14 2156 April.¹ This message included Doppler locations with 50% probability for each location.
- Message 3 had a detection time of 14 2205 April and resolved the location.
- Message 4 indicates a SARSAT Low Earth Orbit satellite passed within view of the EPIRB location but a signal was not detected.
- Message 5 indicates a SARSAT Geostationary satellite received a signal from the EPIRB at 14 2335 April. Geostationary satellites cannot determine locations.
- Message 6 indicates a SARSAT Low Earth Orbit satellite passed within view of the EPIRB location but a signal was not detected.
- Message 7 indicates a SARSAT Low Earth Orbit satellite passed within view of the EPIRB location but a signal was not detected.
- Message 8 indicates a SARSAT Geostationary satellite received a signal from the EPIRB at 15 0236 April. This is the last time the SARSAT system detected this EPIRB.
- Message 9, 10, and 11 indicate a SARSAT Low Earth Orbit satellite passed within view of the EPIRB location but a signal was not detected.

¹ Note: The "detect time" appears out of sequence due to the technicalities of satellite reception with or without Doppler location capability. DETECT TIME: For solutions with Doppler location, the Time of Closest Approach (TCA) of the satellite to the signal source. For 406 MHz solutions without Doppler location, the time that the last data burst was received by the LUT." (note LUT = earth ground station called Local User Terminals)

3. District 11, Group San Francisco Coverage Areas



4. **Air National Guard 129th Rescue Wing:** Pararescuemen and HH-60G Pave Hawk helicopter aircrews from the 129th Operations Group prepare for a rescue mission at Moffett Federal Airfield, Calif., April 15, 2012. Airmen from the 129th Rescue Wing assisted Eleventh District U.S. Coast Guard with the rescue of civilian sailors near the Farallon Islands, 45 miles west of San Francisco, April 14-15, 2012. A civilian vessel was hit by a large wave that washed crew members overboard before sending the vessel onto rocks near the island. Figure 3, Air National Guard photo by Staff Sgt. Kim Ramirez



Appendix G: Medical Reports, Injuries to Crew, Survival

MEDICAL REPORT & SURVIVAL ASPECTS Kent Benedict, MD, FACEP Medical Advisor US Sailing Investigation Panel LSC Incident, Full Crew Farallones Race April 14, 2012

PART I: FACTUAL INFORMATION

Sources:

- a) Medical Examiner/Coroner Reports
- b) Various Interviews with Surviving LSC Crew
- c) Interviews with Sailors on other Vessels in FC Farallones Race
- d) Data from weather buoys/charts/USCG reports/interviews

Methodology:

Whenever possible, information evaluated for validity and accuracy by corroborating statements/reports from multiple sources. Note that San Francisco ME Reports remain “interim” until full toxicology data is available – approximately 3 months after post-mortem exam.

Identifiers:

- a) For purposes of this report the individual LSC crew members shall be identified by initials only
- b) Specific information not available to the Medical Advisor will be noted as “n/a”

I) LSC Pre-Event - Preparation Phase

- 1) Physical/mental conditioning and general state of health of crew
 - a) Crew member BC self-reported in good physical condition – 18 months of gym work outs, runner
 - b) Crew member NV reported to be in good physical condition, athletic
 - c) Remaining crew members – n/a
 - d) General mental attitude – positive, well rested, no sleep issues, anticipating the usual challenging environmental conditions for the event
- 2) Medical histories including medications, recent significant illness or injury
No known illnesses, recent injuries, medications – most information n/a
- 3) Known susceptibility to motion sickness, cold environments
 - a) AB seasick on 2011 FC Farallones event
 - b) Other Crew? n/a
- 4) Alcohol or drugs ingested just before or during the event
 - a) AC & NV split “a beer” during race
 - b) San Mateo Coroner’s Report states toxicology screen on MK was negative for 231 substances including alcohol, common medications and recreational drugs of abuse
- 5) Safety gear & protective clothing for anticipated environmental conditions of event
 - a) Layered clothing and foulies by seven crew
 - b) One crew, MK, wearing shorts, layered under clothing, foulie jacket
 - c) PFDs, harnesses, tethers, signaling devices – see details in other sections of report

II) LSC Event Phase (Pre-Accident)

- 1) Seasickness

- a) Two crew, AB & EM, with mild seasickness, remained on-deck, nausea, no vomiting⁹
- b) EM took an OTC medication (Dramamine?) during race, felt better
- 2) Injuries
 - None
- 3) General Physical Discomfort as a Distracting Issue
 - n/a
- 4) Use of Protective Clothing
 - Some crew described removing clothing layers during delay in start inside Bay, layering up again during race except for one (deceased) who had shorts on, no foulies below waist.
- 5) PFDs, Harnesses, Tethers, Signaling Devices – see details in other sections of report

III) LSC Accident & Survival Phases

- 1) Injuries
 - a) EM, 30 y/o M, fatal accidental drowning, pronounced 18 days post-accident, 4 rib fractures right side of chest (unknown if contributory)
 - b) JF, 25 y/o M, fatal accidental drowning, pronounced 12 days post-accident, no significant contributing injuries
 - c) MK, 46 y/o M, fatal accidental drowning, pronounced hours after accident, multiple contusions/abrasions (post-mortem, non-contributory)
 - d) JB, 41 y/o M, survivor, no injuries
 - e) NV, 26 y/o M, survivor, minor/moderate injury – non-displaced fracture of fibula
 - f) BC, 38 y/o M, survivor, minor injury – left rib contusions
 - g) AB, 20s y/o F, missing/presumed deceased
 - h) AC, 36 y/o M, missing/presumed deceased
- 2) Drowning
 - a) Interim ME & Coroner Reports on all of the three crew examined list drowning as the cause of death
 - b) Two surviving crew (BC,JB) report inhaling water, difficulty breathing, difficulty maintaining head/face out of water, mental and physical exhaustion within 15 minutes of cold water immersion while attempting to reach shore.
- 3) Hypothermia - an Issue? (see ANALYSIS for discussion)
 - a) Water temp 51-52 degrees F, 10.5-11 degrees C
 - b) Interim ME & Coroner reports did not consider hypothermia a significant factor in the fatal drownings
 - c) Survivor, BC, underwater for unknown period (on boat) during first wave, second wave washed him off boat, 15 minutes struggling in cold water to get to shore, extremely rough surf conditions, assisted by NV to extricate from water, states not feeling cold in water, but weak, uncoordinated, mentally fatigued and physically exhausted trying to get on rocks, very cold once reaching land, donned jacket & hat provided by NV on land
 - d) Survivor, JB, underwater for unknown period when first wave washed him off boat, approximately 15 minutes struggling in cold water to get to shore, extremely rough surf conditions, self-extricated to land but trapped on rocky ledge
 - e) Survivor, NV, was underwater for unknown periods (on boat), at least twice during accident, stayed with boat, self-extricated from vessel to land
- 4) Physical Challenges Secondary to Environment
 - a) Sea state/water temp (see above) – cold water, rough breaking waves near shore, wind spray, both BC & JB found it difficult to maintain airway or breathing without inhaling water/foam

⁹ Correction from Nick Vos: Alexis definitely vomited and was considerably seasick for the majority of the way to the Farallones. Elmer may have vomited though I am not certain.

- b) PFD issues – both BC & JB struggled to keep their PFDs from riding up chest, sapping energy and concentration, only with considerable effort were PFDs functional in maintaining head/face out of water in rough water and shore break conditions
 - c) Swimming – impossible to fight surf, PFD issues required arms/hands to keep PFD in place, swept BC & JB to jagged rock ledges, no choice in where they could land
 - d) Crew (MK & AC) observed to make it to rocks but unable to self-extricate onto land, MK floating face down in water (presumed drowned), MK’s PFD up around head¹⁰
- 5) Emergency Observations & Actions taken by Crew
- a) EM – not seen again after first wave
 - b) JF – in water after first wave, grabbed port side boat rail or lifeline, BC attempted to pull him onboard, second wave washes BC off boat, possible single signal from JF’s PLB, not seen again after second wave
 - c) AB – seen in water after first wave, 10’ astern/port side, conscious, gave “thumbs up”, not seen again after second wave
 - d) MK – in water after first wave, makes it to rocks, failed in attempt to self-extricate onto rocks near JB, last seen floating face down
 - e) JB – in water after first wave, made it to rocks, self-extricates from water, trapped on ledge, unable to meet up with BC & NV, JB near MK but unable to help, observes MK face down in water, unresponsive
 - f) NV – still on vessel after first wave, injured leg from first wave, attempted to pull AC onboard, second wave washes AC away, BC swept away, NV now only crew still on vessel, rides vessel to shore, attempts VHF Mayday, retrieves flares (parachute, smoke, “road flare”), flares deployed to direct SAR to survivors, loans jacket/cap to BC
 - g) BC – still on vessel after first wave, attempts to pull JF onboard, second wave washes BC off boat, he makes it to shore, searches with NV for other crew, they find JB trapped and inaccessible on ledge, keeps watch on JB while NV retrieves flares from boat and then deploys rescue flares
 - h) AC – in water after first wave, grabs port side boat rail or lifeline, NV attempts to pull him onboard, second wave washes AC away, seen in water 10-15’ astern, NV tries to get a line to him, AC disappears, then seen swimming towards JB & BC but appears to be drowning, AC’s waist pack PFD appears to not have inflated, he makes it to rocks, unable to get out of water, AC not seen after that

Brief Note on Weather & Sea State & Seawater Temperature as Survival Factors

- 1) Wind & Sea State (from multiple observers on race boats) – Clear weather, good visibility. Open Water ground swells 12-15’(occasionally 18’), 13 seconds. Near the island swells steeper and shorter, heavy spray, "big waves", heavy surf, around NW rocks of Maintop (lee shore). Wind out to islands – approx. 20kts, reported out of WNW - 290-300 degrees. Wind increased near the islands, building to 25kts with gusts to 30kts around Maintop.
- 2) Water temperature reported by weather buoys 10.5-11.1 degrees C.

PART II: ANALYSIS

- 1) Physical/mental conditioning and general state of health of crew

¹⁰ Correction from Nick Vos: Alan may have been seen face down and motionless in the water near the shore by Jay, though I think it is more likely to have been an article of Marc's clothing that we saw.

The crew was well rested, in good general health, no *known* medications and at least two were in above average physical conditioning.

2) Seasickness

Two crew with mild seasickness. Both took OTC medication during race. Both crew died in incident. Seasickness or meds unlikely a contributor to death.

3) Alcohol or recreational drugs

None known. 1 beer “split” between to crew during race. Post-mortem exam on one crew revealed no alcohol or drugs. Post-mortem lab analysis not completed on two other crew at time of this report.

4) Protective clothing -

Mostly standard dress for this race. All but one wore layered clothing and outer foulies, boots, etc. One crew (deceased) wore shorts, layered upper clothing and foul weather jacket. No crew mention of feeling cold during race. One crew opined that a rash guard type undergarment might have kept him warmer in the water. Two survivors mention difficulty climbing onto rocks with water-logged clothing/boots.

5) Safety gear

a) Many different types of PFDs. The two survivors who were swept overboard wore auto-inflating PFDs (WMP4000) which activated, both with harness and tether attached to person, no crotch straps. Both had difficulty keeping PFDs from riding up. Of the 5 deceased, 3 crew wore inflatable PFDs. 2 inflatables possibly inflated; one did not (a belt-pack style).

b) Harnesses & tethers. 2 out of 8 crew wore harnesses with tethers attached (both survived), but none were tethered to boat.

c) One deceased crew had a PLB which possibly activated (not confirmed).

6) Injuries

One survivor with bruised ribs, a second survivor with non-displaced fibular fracture, one deceased had 4 fractured ribs on one side of chest. The fractured ribs could have been an additional survival factor.

7) Cause of Death

From autopsies on three of the deceased – the proximate cause of death for all was drowning within short period of time after entering water. From interviews with survivors the most like scenario leading to death was a combination of cold water shock, rough sea state, rough surf conditions.

PART III. RECOMMENDATIONS

1) Training/Education

a) Prevention – see Seamanship recommendations in other parts of the Investigative Panel’s Report.

b) Medical

Physical conditioning in at least two survivors may have had a positive influence on survival – include this issue in future SASS Conferences, other seminars and training venues.

Publish articles in frequently read print and electronic media.

c) Survival

i) Issue of using appropriate *gear to avoid COB situation. Importance of staying on the boat.* Most important *discussion* needed is about *harnesses and tethers*. Include this in SAS Conferences, other seminars and training venues. Publish articles in frequently read print and electronic media.

ii) The *physiologic response to sudden cold water immersion* and the difficulty to mitigate the consequences of this response to cold water shock). Should continue to be the cornerstone of any medical presentation at SAS, other conferences/seminars and training venues. Publish articles in frequently read print and electronic media.

iii) PFDs – emphasize the importance of *auto-inflation and crotch straps*.

2) Rules/Regulations & Enforcement

Under the Medical Report – none suggested at this point except possibly regarding mandated gear consistent with expected environmental conditions during the race.

Appendix H: Vessel Damage

Low Speed Chase Immediately after grounding:



Sophie Webb, 14 April 2012

This photograph makes it clear how challenging the initial encounter with the rocks would have been. Yet, the boat remained substantially upright and the one survivor who stayed on board was able to jump safely to the rocks for rescue.

The pictures below were taken two days later by the San Francisco Police Department and show the boat in substantially the same place, still intact.



SFPD, 16 April 2012



SFPD, 16 April 2012

On 23 April 2012, Ballard Diving and Salvage lifted Low Speed Chase from the SE Farallon Island and transported the vessel to Half Moon Bay. From there it was later trucked to an insurance storage yard.

Appendix I: Race Organization/Communications

Details of Findings, by Bartz Schneider

The Organizing Authority (OA) for the Full Crew Farallones Race on April 14th, 2012 was the Yacht Racing Association of San Francisco Bay. The Notice of Race (NOR) for the event applies for the entire 2012 Ocean Yacht Racing Association (OYRA) Ocean Racing Series. The Sailing Instructions (SIs) for the event were the YRA Standing Sailing Instructions for the 2012 season, with a separate section entitled OYRA Additional Standing Sailing Instructions. The OYRA also issues a separate set of SIs specific to each event that they run. All three of these sets of SIs are posted on the YRA web-site. (Copies of the NOR and the SIs are included in Appendix A.)

Both the NOR and the SIs for the event invoke the OYRA Minimum Equipment Requirements (MER), which are the ISAF Category 2 requirements plus the US Sailing Prescriptions, with a few local exceptions. (A copy of the local Prescriptions to the MER document is included in Appendix A.)

Both the NOR and the SIs were prepared and posted by the YRA. The “sponsor” yacht club was the San Francisco Yacht Club (SFYC), which by agreement with the OYRA supplies the race committee (RC) personnel and equipment for the event, and runs the event. The St. Francis Yacht Club (StFYC), also by agreement with the OYRA, allows the starts and finishes of the race to be run from their race deck on the City Front.

The Marine Event Permit (MEP) for the event was issued by the USCG Sector San Francisco Department of Waterways Management on April 5, 2012. The letter issuing the permit includes numerous conditions associated with the permit. The CG also prepared and sent to the YRA a Communications Plan document for the event, which also noted these conditions and additional communications requirements. In addition, the YRA prepared a Permit Letter, generic to all CG permitted events (not specific to offshore events), and an offshore event specific “2012 Ocean Racing Procedures for Race Committee” document. Copies of all of these documents were e-mailed to the SFYC Race Office and to the PRO on the Thursday evening before the event. The specific permit conditions and procedures put forward in these documents included:

- Provide detailed vessel particulars to the CG prior to the event (YRA)
- Contact CG Golden Gate station prior to the start for latest weather conditions. (RC)
- Check in with VTS before the start and at the conclusion of the event, and every four hours. (RC)
- Monitor VTS VHF channel 14 throughout the event. (RC)
- Remind participants of Rule 9, which prohibits interference with commercial vessels. (RC)
- Maintain 100% “accountability” for all event participants. (RC)

The CG has noted that certain of these conditions were not complied with for the Full Crew Farallones event. (Copies of all of the above-mentioned documents are included in Appendix A.)

The Principal Race Officer (PRO) for the event was supplied by the SFYC. The PRO was an active Bay and ocean sailor for twenty years in his youth. He is a US Sailing-certified National Race Officer, and has run many Bay and ocean races over the last twenty years as a PRO. He stated that he has run at least ten Farallones races over those twenty years, but has not been the PRO for an ocean race in the last ten years, and so was not familiar with the many changes in CG race management procedures over those years. The PRO was assisted by numerous volunteers from the SFYC who worked with him in shifts on the race deck from approximately 0750 hours until approximately 2345 hours.

The Sailing Instructions for the Full Crew Farallones Race did not include a provision for a Skippers Meeting of any kind, either mandatory or optional, in person or virtual. Nor did they include a requirement regarding

skipper or crew attendance at Safety at Sea seminars. Some of the Organizing Authorities in the Bay Area do require skippers' meetings prior to racing, and some, most notably the Coastal Cup and the Pacific Cup do require a proportion of the crew to have attended a Safety at Sea seminar. However, for the OYRA events, these requirements are not included in the SIs.

Both the YRA Standing Sailing Instructions and the event specific OYRA SIs state that each boat competing in an OYRA offshore event is required to submit a Crew/Boat Information and Statement of Compliance (CBISOC) form to the YRA office prior to 1700 hours on the Thursday before the race. This form includes the name and emergency contact information for each crew member as well as a signed statement of compliance with the MER. These forms are then compiled by the YRA office and e-mailed to the Coast Guard (CG) permitting office on Friday morning. Updates to the CBISOC that are received by the YRA later on Friday are e-mailed separately by them to the CG. Boats not submitting a CBISOC are considered to be not entered.

The CG has noted that on the Low Speed Chase (LSC) CBISOC, the emergency contact information for several crew members was in fact a participant in the race on another boat. The CG has requested that procedures be implemented to prevent this from happening in the future.

The CG also noted that while each skipper is required to certify on the CBISOC that his boat is in compliance with the OYRA Minimum Equipment Requirements (MER), if there is no provision for equipment inspections, as was the case for the Full Crew Farallones race, then there is no way to know to what extent the boats are actually in compliance. The CG indicated that they have reason to believe that not all boats participating in offshore events are actually in compliance with the MER.

In the OYRA section of the Standing Sailing Instructions, it is noted that all boats participating in an OYRA event are required to check-in via VHF radio prior to the start of the event, to establish two way communications with the race committee, and to indicate the number of persons on board. In the event-specific SIs for this event, the check-in period was specified as between 0830 and 0930. However, these event-specific SIs did not note that the check-in information was required to include the number of people on board.

The PRO reported that the radio check-in traffic was very difficult to follow due to some boats checking in from far away, low quality of some transmissions, transmitters stepping on other traffic, etc. One boat attempted to check in multiple times as they apparently could not hear the RC acknowledgements, thus tying up the check-in channel. Eventually, all boats were checked in. However, many boats checking in did not include information on the number of people on board, and the RC did not record that information for each boat as they checked in.

Prior to coming to the race deck, the PRO received a physical copy of the race deck package prepared for him by the SFYC race office. This package included the permit information, the required CG Vessel Traffic Service (VTS) check-in procedure, boat check-in recording sheets, starting sheets showing entrants by division, and finish recording sheets. The PRO also received a package of race deck materials from the YRA office via e-mail (as noted above), which included the same check-in, starting, and finishing sheets, but also included the CG Marine Events Permit (MEP) letter with permit conditions, and the CG prescribed communications plan for the event. By separate e-mail, the PRO also received copies of all of the CBISOC forms for the entered boats, as sent by the YRA to the CG. Neither set of check-in recording sheets included the number of persons reported as being on the boat on the CBISOC form.

The PRO stated that he looked at the package of materials sent by the YRA on his computer, and did bring the computer to the race deck in case he need the documents. But thinking that he already had all of the forms and information he needed to run the event in the package sent to him by the SFYC, he never printed out or read carefully the YRA documents, and so missed reading the specific CG permit conditions and the specific check-in requirement regarding the number of people on board.

One of the CG permit requirements is for the PRO to call the CG Golden Gate station (CGGG) prior to starting the race to check on weather conditions and sea state in the ocean. The PRO failed to make that call. CGGG has stated that they subsequently called the race deck and did speak with the PRO about the conditions, which were within a normally safe range.

The CG has reported that during debrief, the owner of Low Speed Chase (LSC) stated that during check-in, they reported that there were eight persons on board. That information appears not to have been recorded by the RC. The original CBISOC submitted by LSC showed seven persons on board. A revised CBISOC showing the added crewmember information for Bryan Chong was received by the YRA on Thursday evening, but that revised information did not make it onto the CBISOC sent to either the CG or to the PRO. The discrepancy between the eight persons reported at check-in and the seven persons on the CBISOC was not noted on the race deck. As a result, the detailed crewmember information in the hands of the CG was missing one person, Bryan Chong, and the race deck was also not aware that Chong was on the boat.

The CG has indicated that it is very important for the crew information that they receive to be accurate, since it is an important consideration in determining the Search and Rescue (SAR) resources needed to be deployed. The CG also indicated that when they retrieved Chong from the Southeast Farallon Island, he gave his name, which was not on the crew list for the LSC, and they were concerned briefly that another boat might have been involved.

The RC log from the race deck shows that at 0920 hours, the PRO did call the VTS and check-in with the race information as required by the permit conditions. The PRO reported that he also discussed wind and sea state conditions with the VTS on that call.

At 0940 the first warning was sounded, and at 0945, the first division of boats, which included LSC, was started. The conditions were wind light to calm, with a substantial ebb current in the starting area. At 0946, the starting sequence was postponed due to lack of wind. At 0955, the starting sequence was resumed and the remaining divisions were started. Conditions remained very light. Several boats, including LSC, drifted past the starting line in the ebb without properly crossing the line. LSC then anchored to wait for sufficient wind to sail back and start properly. LSC finally made it back to the line and started at 1052, approximately 1 hour and seven minutes after the other boats in their division. (One other boat from a subsequent division, drifted past the start line, and later indicated that they intended to sail the course anyway, even though they had not started properly. This situation presents a particular challenge for the RC accountability process.)

The race deck was monitoring VHF channels 16 and 69. There were numerous incidents and communications from boats to the race deck on VHF channel 69 as the fleet sailed out the Gate toward the islands. Several boats called in as retiring. One called to report they had been dismasted and were withdrawing. Another called to request help with a crew member suffering from hypothermia, and a chase boat from the StFYC was dispatched to assist.

On the date of the LSC incident, the RC on the race deck was unable to either be heard by the boats or to hear the boats' transmissions that were in the area of the incident. Prior offshore race managers have indicated that this is almost always the case on the StFYC race deck. Once the boats are outside the Gate, communications with the boats are effectively lost. Therefore, the RC was not able to provide any practical assistance to the CG during their response to the incident.

The GPS track from LSC indicates that at 14:36:53, the boat's course changed direction abruptly as a result of being struck by a large wave, and by 14:38:32 the LSC was on the rocks.

The CG reported that at 1439 hours, they received an initial call on VHF 16 from an unidentified boat reporting they had spotted a boat on the rocks at the Southeast Farallon Island. The RC log indicates that at 1446 they heard a call on VHF 69, also from an unidentified boat, reporting a sighting of a boat on the rocks at the island. At 1447 the PRO hailed the fleet on VHF 69 requesting any further information, but reports they received no response.

The CG reported that shortly thereafter they received another VHF call from an unidentified boat which they understood to say that the boat on the rocks was *Temerity*, sail # 28134. The RC log indicates that at 1458 they received a call on VHF 69 from an unidentified boat which they too understood to say that the boat on the rocks was *Temerity*, sail # 28134. The PRO indicated that he called and advised the CG of same at that time. The CBISOC for *Temerity* indicated that there were four persons on board. The CG indicated that for some time into the SAR mission, they thought that they were rescuing *Temerity*. The RC log indicates that again at 1459 the race deck hailed all boats for more information and again received no response.

The CG reports that they gave the order to deploy the SAR resources immediately. The SAR helicopter based at SFO was in the air at the time of the initial order, with insufficient fuel for a protracted SAR mission at the island, and so was diverted back to SFO to refuel before departing to the island. CG reported that the helicopter arrived at the island 59 minutes after the first call was received.

The CG Command Center (CGCC) reported that VHF communications immediately following the incident were very difficult to decipher. Transmissions were garbled, callers would frequently step on each other, wind noise in mikes was excessive, and some callers reported that they were turning radios off since they were useless on deck under the conditions. Also, callers frequently omitted key information needed by the CG, necessitating lots of back and forth communications with CG questions, thus consuming radio time and increasing communications uncertainty. CGCC referred to the communications conditions as the "fog of war".

CG indicated that it would be very helpful to them to have better discipline in the Mayday calling procedures of the boats. Commercial passenger vessels are required to have a placard at the communications station listing the key elements to be reported as part of any Mayday call to the CG.

The CG reported that at approximately 1515 hours they received the first report from SARTSAT that an EPIRB signal had been received in the vicinity of the Farallones. Two passes of the satellite were recorded. CG reported that the position indicated was approximately 4 miles from the island, but that such a margin of error is not unusual for a first hit, and in no way hampered their SAR efforts. The beacon ID was reported, and the CGCC was able to match the ID with the LSC CBISOC. Apparently the EPIRB was not registered to the LSC with SARTSAT. Up until the beacon ID was matched to LSC, the CG thought they were rescuing *Temerity*. The RC log shows that at 1515 hours, the CG called the race deck to report that the LSC EPIRB signal had been detected.

Also, CGGG reported that at around 1500 they called the race deck to inquire how many boats were on the course, and someone on the race deck told them that they were not certain. The PRO stated that he had no recollection of that call, and that to his knowledge no one on the race deck other than himself answered any calls to his cell phone.

At 1751 hours, the race deck received a VHF call from Temerity saying that they were approaching the finish line. The PRO immediately called the CG to report that Temerity was not in trouble.

In the hours between around 1500 until the RC checked out with the CG at 2345, the RC log indicates there were numerous calls back and forth to the CG, but no specifics of those calls were recorded.

All accountability records – boats checked in, boats retiring, boats finishing, and boats still on the course – were kept by hand on paper records on the race deck. At the end of the day, the PRO reports that all boats were properly accounted for.

The CG indicated that the approach to safety requirements and related procedures varies widely across the different organizations that act as OAs for Bay Area offshore racing with respect to skippers' meetings, equipment requirements, inspections, and mechanisms and procedures for information flow to the CG. The CG has encouraged the local organizations to take a more coordinated and consistent approach to these and other safety related areas. The local organizations are in the early stages of a process, accelerated by this incident, to work together toward this goal.

Conclusions –

We believe that all PROs for offshore races should be trained and aware in detail of all CG permit requirements, and the established processes and procedures for complying with those conditions. The newly formed Bay Area Ocean Racing Council should institute a training session each spring (possibly in February), which all PROs for offshore races in the coming year are required to have attended. Subjects covered should include:

- Detailed description of all MEP conditions and requirements.
- Details of the crew/boat information collection and reporting process, with particular attention to the updating process as required.
- Training of race deck personnel on details of the process for collecting and recording crew/boat information updates on race day.
- Procedures for insuring “accountability” information on the race deck is accurate, up-to-date, and ready for communication to the CG at all times.
- Resource staff planning for race deck personnel to insure ability to dedicate resources as required to all race deck responsibilities.
- Detailed description of all communications and data flows to the CG, whether manual or automated.

All documents, including the pro forma permit letter and conditions, the CG prescribed communications plan for offshore events, the YRA permit letter, and the OYRA Ocean Racing Procedures for Race Committee document, as well as pro forma versions of all check-in, starting, finishing, and accountability forms should be conveyed to each PRO and RC personnel at that seminar.

The OA and Sponsor organizations need to be responsible for knowing, and perhaps certifying to the ORC, that each PRO for a race that they run has been to one of these sessions (perhaps in the past two years), or is accompanied on the race deck by someone who has. The ORC should also keep a list of the PROs who have

attended one of these sessions, and annually update them (at least via e-mail) of any changes to the CG permit requirements that may have occurred during the past year.

We also believe the NorCal-ORC should put in place a process to ensure that all offshore skippers have the appropriate knowledge and awareness of all aspects of seamanship and safety. One way that this might be achieved is to institute mandatory skippers' meetings for all offshore skippers. No skipper would be allowed to participate in an offshore race unless he (or perhaps his tactician or paid captain) had attended at least one of these skippers' meetings in the last two years. We envision that these meetings would be like mini-safety at sea meetings, where all safety aspects of offshore racing would be covered, including the influence of depth and shoaling considerations on course selection and minimum distance from a lee shore. Other subjects would include the importance of accurate crew information, communications discipline during check-in and with the CG. For OYRA races, these meetings could be held once or twice before each season. For the other OAs, they could be race specific, or qualified for multiple races. For all of them, there would be a minimum curriculum to be covered, just as in the current Safety at Sea seminars. For skippers who missed the annual meetings who none the less wanted to enter an OYRA race, there could be an on-line equivalent to the meeting that would suffice for individual races. The details of how this might work are left to the NorCal-ORC to work out

The YRA office collects the required Crew/Boat Information and Statement of Compliance forms from each entrant in an offshore race by the Thursday evening before the race. This form includes all of the boat information, the skipper's certification that the boat complies with the MER, and the detailed information including emergency contact and next of kin for each crew member planned to be on board. Some entrants submit revised forms updating the crew information as late as Friday afternoon. The YRA needs to tighten up its internal procedures for handling these CBISOC revisions, at least in the short run while the current manual paper processes are in use. The YRA staff is well aware of this need. If updates to the CBISOC information are received by the YRA office after the Thursday submission but before the COB on Friday, the CG requests that these updates be combined by the YRA and e-mailed as a package to a list of e-mail addresses to be supplied by the permit office, including the permit office itself, the VTS office, the CG Command Center, and the SAR operations office.

The importance of absolute accuracy of the crew information on the race deck when the boat starts the race must be impressed repeatedly on the skippers. It is frequently the case that a crew member who was listed on the CBISOC will not show up on race day. Or an additional crew member or two who are not listed will be picked up the yacht club or marina on race day. It is essential that the information regarding these crew member changes be communicated reliably and accurately to the RC at check-in. These last minute updates do not need to be transmitted to the CG on race day in the current system. The CG has indicated that the VTS and Command Center do not have the resources to update their records from the phone or radio on race day. They did indicate that the VTS would appreciate a call from the RC on race day to let them know that the RC does have updates, so in the event of an incident, they will know to call the RC to get those updates prior to any deployment of resources.

The CG also indicated that there is a need to improve the updating process for the "24 hour POC". The permit application has spaces to enter the name and contact phone for both the event coordinator and the on-the-water or 24-hour POC. If both are indicated on the permit application, then both are entered on the permit. If, as in the LSC case, only the first contact is indicated, in this case Anne McCormack of the SFYC race office, then

that contact is listed on the permit as the POC, generally requiring a later revision. In the LSC case, the PRO indicated that it was known that he would be the PRO for the event many weeks in advance. In cases where the PRO's name is known prior to the permit being issued, usually within the last week before the event, and the name was not included on the original application, that information should be communicated directly to the permit office in advance to be added to the permit when issued. If the PRO's 24-hour contact information needs to be updated after the permit has been issued, that update information needs to be e-mailed to the same list of contacts – Permits, VTS, CGCC, and SAR – as specified by the Permit Office as noted above.

The check-in forms supplied to the RC also need to be revised to facilitate the collection of the required check-in information. The forms supplied for the Full Crew Farallones race did not include the number of persons on board as indicated on each boat's CBISOC form. Nor did the form indicate that each boat was required to supply that information at check-in. Thus, even if the boat did indicate the number of persons on board at check-in, there was no way for the person checking the boats in to note any discrepancies with the CBISOC at that point. Also, the permit conditions require the RC to make certain that there is effective two-way communications with each boat by noting the boat's response to their acknowledgement. There was no place provided on the check-in forms for recording this information. The YRA office is aware of these short-comings on the forms, and has taken immediate action to correct them.

The reality of the situation on the race deck at check-in time dictates that manual paper forms be used to record the process. There is simply not time in the limited window provided for most check-ins to record the information in an automated system in real time. The information needs to be input from the race deck to whatever automated system is eventually adopted. But as noted above, the CG will call the race deck for the latest updated information anyway in the event of any incident, and the manual forms need to provide the primary data source for the information, in particular to eliminate any possible errors or omissions in inputting the information into the automated system.

We also believe that the SIs should provide for a separate VHF channel from that used for check-in to collect any required updates to the CBISOC crew member information. Whenever a discrepancy in the crew member information is detected at check-in, the boat should be referred to that reserve channel to provide the required updates. The RC should have a separate operator standing by on the designated reserve channel to collect the required personal information, emergency contact, next of kin, etc. information for any crew members not already on the CBISOC, without tying up the check-in channel.

There is abundant anecdotal evidence that the LSC was not the only boat participating in the Full Crew Farallones Race that had crew on board that did not match their CBISOC crew information. One of the boats which we interviewed repeatedly indicated that there were five persons on board for the race. A check of their CBISOC showed that only four persons were listed. It is clear that the importance of the crew information being "exactly accurate" for every boat and crew is not adequately focused on or appreciated by the participants. There is clearly a need for increased attention to detail and discipline in the crew information process, not only on the parts of the OAs and the RCs, but also on the part of the competitors themselves. This is a key area where education and awareness of competitors is important.

In the longer term, the YRA in conjunction with the new ORC needs to develop a consistent process, and perhaps an automated platform to support it, that can be used by all offshore OAs. A common web-based

system would allow for the on-line submission and revision of all CBISOC information by the entrants. This web-based system could then provide direct on-line real-time information availability to the CG, similar to the current Jibeset-based system used by the Bay Area Multi-hull Association (BAMA).

However, even if an automated system for collecting, updating, and communicating boat and crew information to the CG is developed, a carefully designed and implemented manual process for supporting this process on the race deck itself will be essential. The CG has indicated that in the event of an incident, they will always call the race deck to confirm that all of the information in the system matches exactly the latest information that may have been collected from the boats on the race deck.

With the current paper-based CBISOC process, only the participants can practically prevent the case where one person's emergency contact is a participant on another boat. Manually cross checking each name against all other crew names in the race is not a practical solution. With an eventual standard automated platform, this process will be easily incorporated. But for now, the importance of each participant preventing this from happening is another key area for participant education and awareness.

We believe that the likelihood of full and complete compliance with all minimum equipment requirements will be significantly increased by at least the possibility of equipment inspections. Some races already have mandatory full inspections of all boats; others have random inspections of selected boats, while still others, including the OYRA races, have no indicated inspections of any kind. There are numerous possible ways that inspections can be implemented, including pre-race, post-race, random and mandatory. The trade-offs between the various approaches are complex, and therefore are an appropriate issue to be addressed by the NCORC. But we believe that *some possibility of inspection is appropriate for all offshore races.*

The penalty to be imposed for failure to pass an inspection is also a complex issue. For some types of failures, specifically those which are unintentional or due to a misinterpretation of the requirements, DSQ does not seem like the appropriate penalty. On the other hand, for clearly blatant and intentional failures, e.g. the failure to have an EPIRB or PLB on board, a penalty as onerous as a DSQ may be appropriate. This too is a subject for consideration by the NCORC.

RC forms and procedures for maintaining "accountability" information for boats on the course also need to be expanded and tightened in terms of the information collected and the accuracy of that information. *At any point in time, in the ideal case, the RC should be able to inform the CG immediately how many and which boats are still on the course.* When present, the limitations on RC communications with the boats, addressed above and in other parts of this report, will necessarily impede the RC's ability to maintain this information. But the specific information to be collected when possible and the forms to record that information need to be as detailed and complete as possible.

The Full Crew Farallones case provides an insight into one of the complexities which can occur in that process. At the start of the race, the winds were very light in the starting area. Some boats, including LSC drifted past the starting line without actually going through it, and thus had not actually started the race. LSC did eventually return to the starting line and start correctly. But at least one boat radioed the RC their intention to sail the course even though they had not actually started the race correctly. In this case, the CG has indicated that they would prefer to have that boat included in the count of boats on the course. Therefore, *the*

“accountability” form for the RC should include a way to indicate not only whether a boat started correctly, but also whether that boat is on the course even though it did not start correctly.

The RC information on boat location could also be improved by recording, for boats that call in and withdraw from the race, not only that they have withdrawn, but also the time of their withdrawal, their location when they withdrew, and where they plan to go after withdrawal. If a boat withdraws when they are some distance from a port, they may still be on the course for some considerable period of time, even though they are no longer racing. This additional information may be very useful to the CG in the event of an incident. The accountability forms should be enhanced to facilitate the collection and recording of this information by the RC.

The CG has also indicated that they would very much like the RC to have as much information as is practical to collect on where each boat is on the course. On some races, such as the Coastal Cup and the Pacific Cup, both regular roll calls and the use of satellite transponders make it possible for the RC to have very good information on boat locations. However, for the shorter offshore races, roll calls have not been used, and boat position information has been more uncertain. It may soon be possible, with developing technologies, for *better boat position information to be available to the RC*. The newly developed ORC should continually address how and when this might be achieved.

It would significantly improve timeliness and reliability of emergency calls to the Coast Guard Command Center if skippers and navigators were aware of and followed a disciplined communications protocol for such calls. If the CG Command Center is required to ask a series of questions to get the information they need, it ties up radio time, increases the risk of transmissions being stepped on, and generally increases the uncertainty of communications. Commercial passenger vessels are required to have a placard showing such a protocol displayed at their communications station. The details of the protocol are as follows: “MAYDAY, MAYDAY, MAYDAY” for situations involving immediate danger to life and property. “PAN, PAN, PAN” for urgent situations where there is no immediate danger to life or property. “THIS IS (INSERT VESSEL NAME), (INSERT VESSEL NAME), (INSERT VESSEL NAME), OVER”. Release mike button and wait for acknowledgement. If no acknowledgement, repeat first two steps. Then if there is no acknowledgement, or if the CG or another boat acknowledges, say “MAYDAY”, or “PAN PAN” “(INSERT VESSEL NAME)”, and then state in order, your position, the nature of the distress, the number of persons involved, seaworthiness of the vessel in distress, and a description of the vessel. End the message by saying “I will be listening on VHF channel 16. This is (VESSEL NAME).” *The importance of knowing and following this protocol should be taught to all skippers and navigators at all safety seminars.*

There is also opportunity for greatly improving the efficiency and effectiveness of the pre-race check-in process through the use of a more disciplined communications protocol. Boats should be required to check in only after they are in the starting area. Distance from the race deck often results in weak or garbled transmissions. Boats should check in once, stating boat name, number of persons on board, and division. These specific check-in directions were not included in the SIs for the Full Crew Farallones race. After broadcasting the initial check-in information, the boat should then wait to be acknowledged by the RC. When acknowledged, the boat should respond briefly to confirm two-way communications. Other boats waiting to check in should wait for this three message sequence and not key their mikes before it is completed. Finally, if a boat attempts to check in and is not acknowledged by the RC, they should try ONE more time. If still not acknowledged by the RC, they should attempt to contact another boat and ask for a relay, NOT continue to tie up the check-in channel with multiple repeated additional check-in attempts. *Unless two way communications with the RC are established*

before starting, it should be presumed that the radio equipment of the boat is not functioning properly, and the boat should be considered a DNS.

Coast Guard tapes of VHF communications between competitors and the CG Command Center immediately following the incident reveal a wide variation in the quality of the VHF signals being generated by the boat radios. It is likely that this variation is caused by differences in the effectiveness of the antennas being used. Some transmissions may have been on handheld radios, with low power and relatively ineffective antennas. But even for fixed mount radios with masthead antennas, signal quality can be significantly degraded by the use of lower quality cabling and antennas. *This subject will be addressed in depth in another section of this report.*

It would be very useful to the RC and to the CG if the RC were able to communicate with the boats while they are on the course. This would enable the RC to assist the CG with better information on where each boat is on the course in the case of emergency. This is especially true since many transmissions by the boats are often made on the race channel, in this case VHF 69, which the CG does not even cover in the Command Center. The RC could collect information from the boats without tying up the emergency channel. It may be possible to achieve better communications capabilities on the race deck through the use of private antennas and possibly remote controlled radios on the headlands or high spots.

QRC: SAR 23 – PERSON IN THE WATER (PIW) or MAN OVERBOARD

Watch stander:	MISLE Case Number:
CDO:	PS Case Number:
Case Description:	

1. Awareness			
Radio call	Frequency:	High site:	DF Bearing:
Type of Comms:		Original	Relay
--Initial SAR Check Sheet--			
Time/Date:			
1. Position			
Type of Position:	<input type="checkbox"/> Lat/Long	<input type="checkbox"/> Loran Lines	<input type="checkbox"/> Geographic Reference
How determined?			
2. Number of Persons On Board	Adults:	Children:	Total:
3. Nature of Distress (if PIW complete additional PIW box below)			
4. Description of Vessel Name:			
Length:	Type:	Make:	Color:
5. Have all persons on board the vessel put on Personal Flotation Devices / adequate number of PFD's available? Y / N			

Time	Initial	
6. _____ / _____		Advise reporting source of intended actions at this time.
Time	Initial	
7. _____ / _____		Instruct operator to activate its EPIRB if communications are lost.

Person in the Water		
Number:	Description:	<input type="checkbox"/> PFD - type/color:
Time:		<input type="checkbox"/> Exposure Suit
Confirmed? <input type="checkbox"/>		<input type="checkbox"/> Light

****Complete all of the above before shifting frequency: Complete below before hanging up phone****

Reporting Source	
Name:	
Vessel Name:	
Call back number (with area code):	
<input type="checkbox"/> cell phone	Cell Phone provider: _____
<input type="checkbox"/> radio / call sign:	/MMSI: _____
Address/location:	
Is RP willing to stay on scene?	

On Scene Weather			
Winds	Seas	Swells	Visibility
Weather Type			

Updated: April 2011

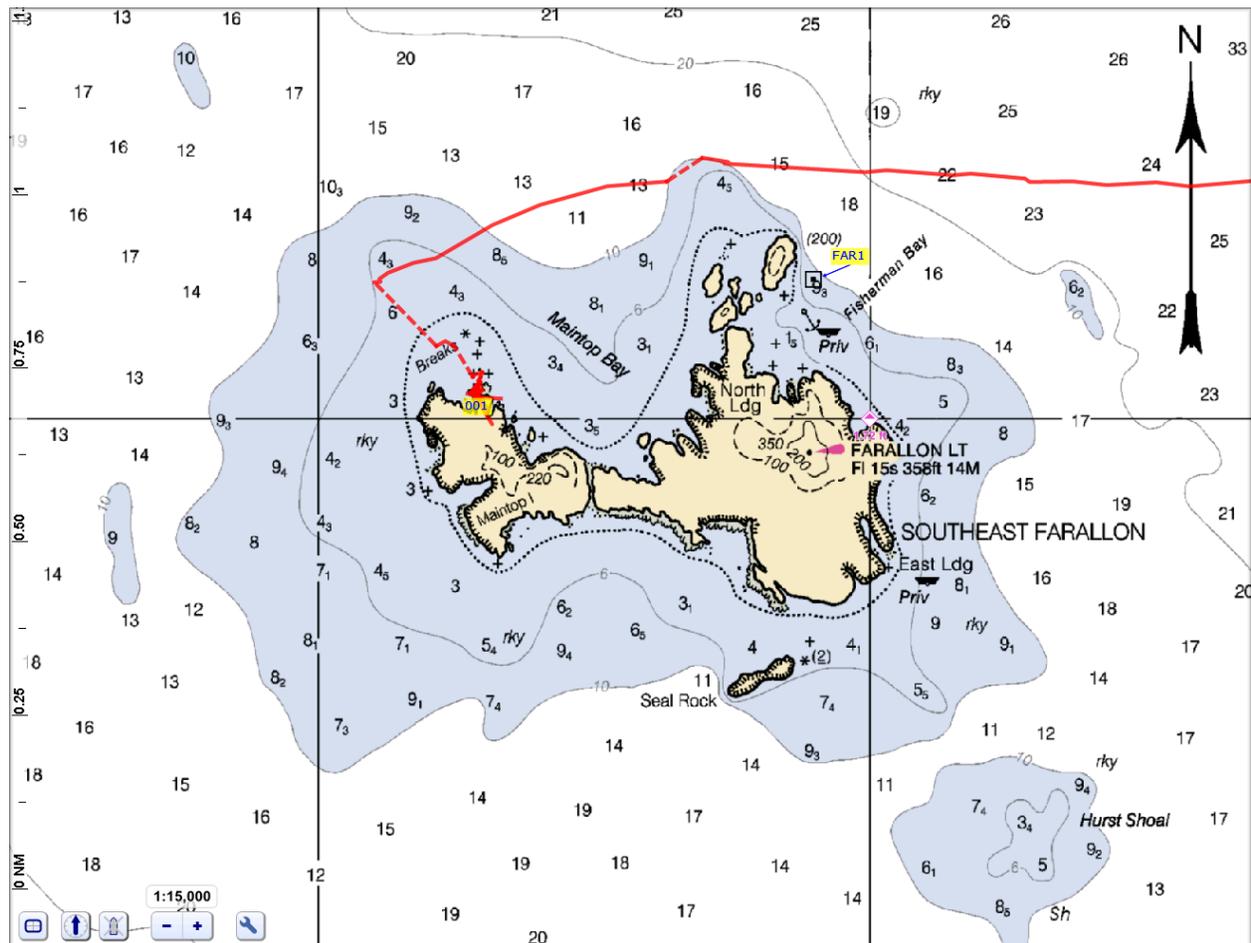
Appendix J: GPS Track Summary

This is a summary of GPS tracks that have been reviewed for the April 14 Full Crew Farallones Race, compiled by Jim Corenman

Low Speed Chase

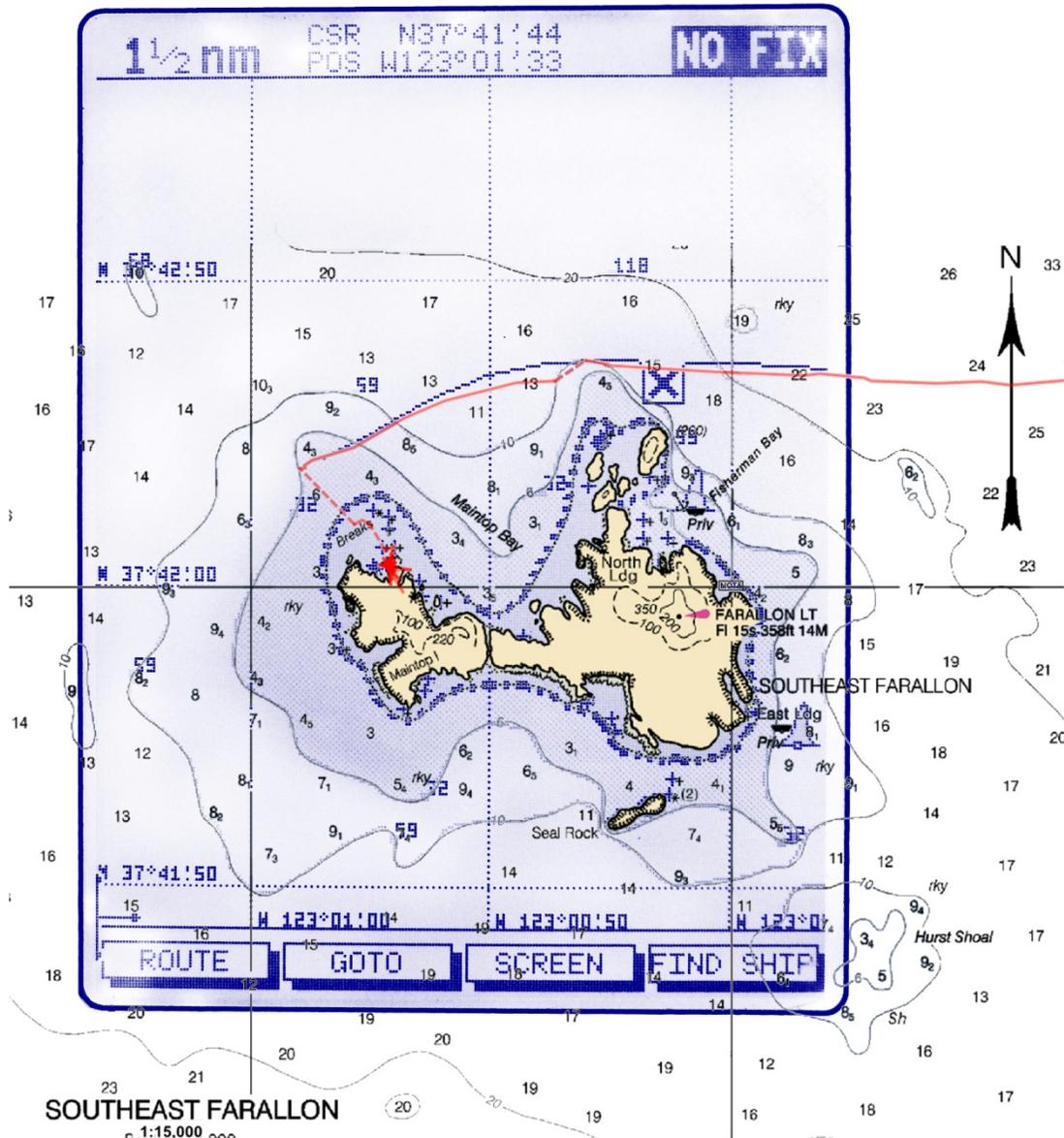
The most relevant track of course is that for “Low Speed Chase”. We have one track which was supplied by USCG as an Excel file, and the same track in “gpx” format extracted from Alan Cahill’s portable GPS by Bryan Chong. This GPS unit was apparently in a mesh bag in the cockpit.

LSC’s track is uneventful until 14:36:40 (PDT) when their speed drops from 10-12 kts down to 5-6 kts and becomes a bit erratic until 14:36:53, when GPS tracking is lost until 14:37:37. During those 44 seconds they were pushed 272 yards SE (average speed 11 kts), this is the dashed SE line shown on the track. (The dashed line indicates loss of GPS data for that period). This is very likely the point where they were capsized, 37°42.196’N, 123°00.897’W. The track becomes very erratic after that point, and by 14:43:21 the boat had basically come to its final position on shore.



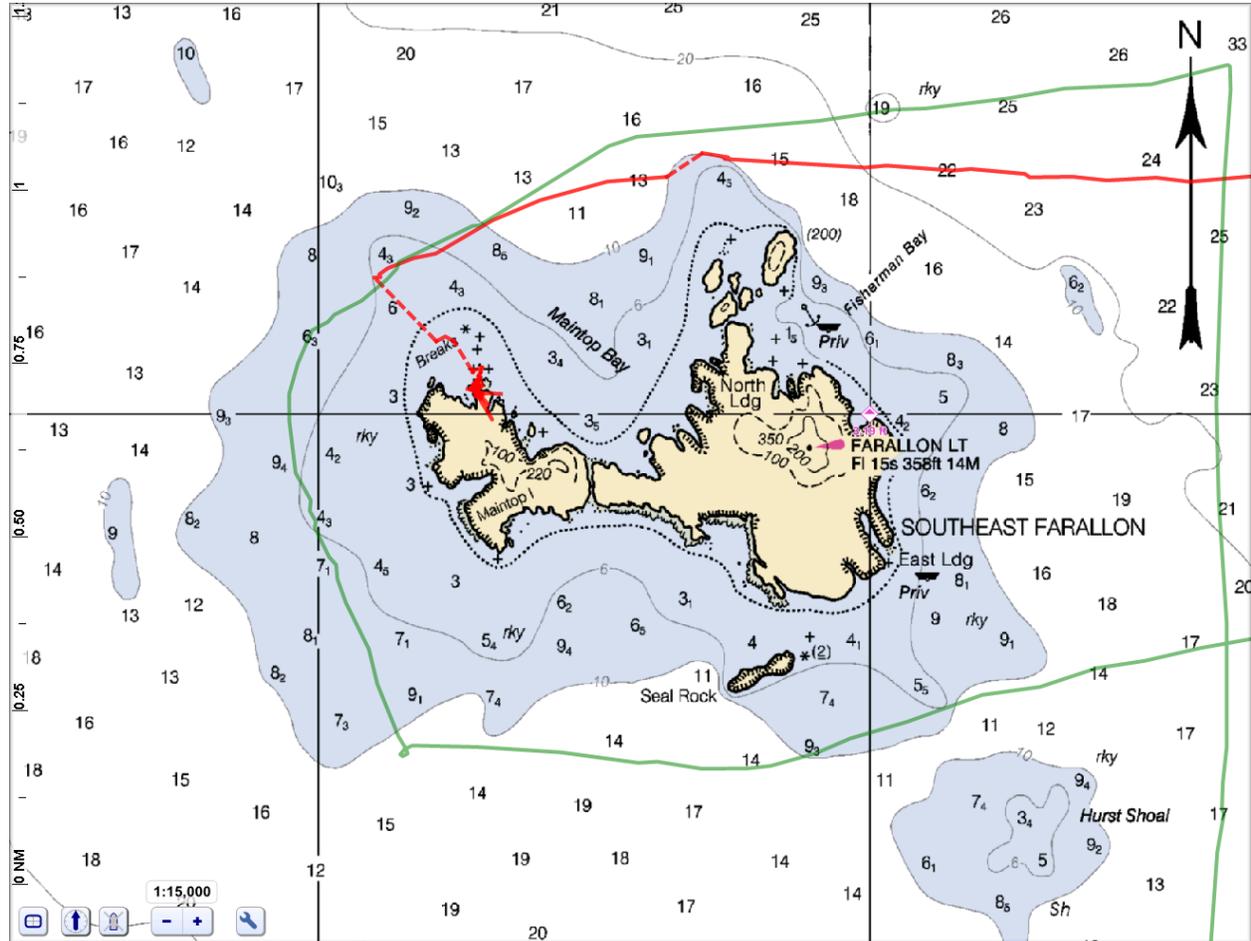
One anomaly with LSC’s track is the small northward “kink” shown just north of “North Ldg” on the chart, skirting the 6 fathom depth contour. This appears to be a GPS tracking anomaly, as part of that “kink” is missing GPS data shown by a dashed line.

Low Speed Chase was also equipped with a fixed-mount Raymarine RC520 **chartplotter**, which was made available. Raymarine has advised that there is no provision for downloading or extracting track data from this, so it was powered up and photographs were taken of the display. The last track point on the display is 37°42.20' 123°00.85', about 66 yards east of where the handheld GPS appears to indicate the capsizes. The unit was then zoomed in to show the area around the Farallones and then photographed. The image was adjusted to correct lens distortion and exposure, and superimposed on a chart image showing the GPS track from Cahill's handheld GPS. The depth contours matched the NOAA chart, but no soundings showed at this zoom level. There are some differences between the tracks, but good agreement around the point of capsizes.

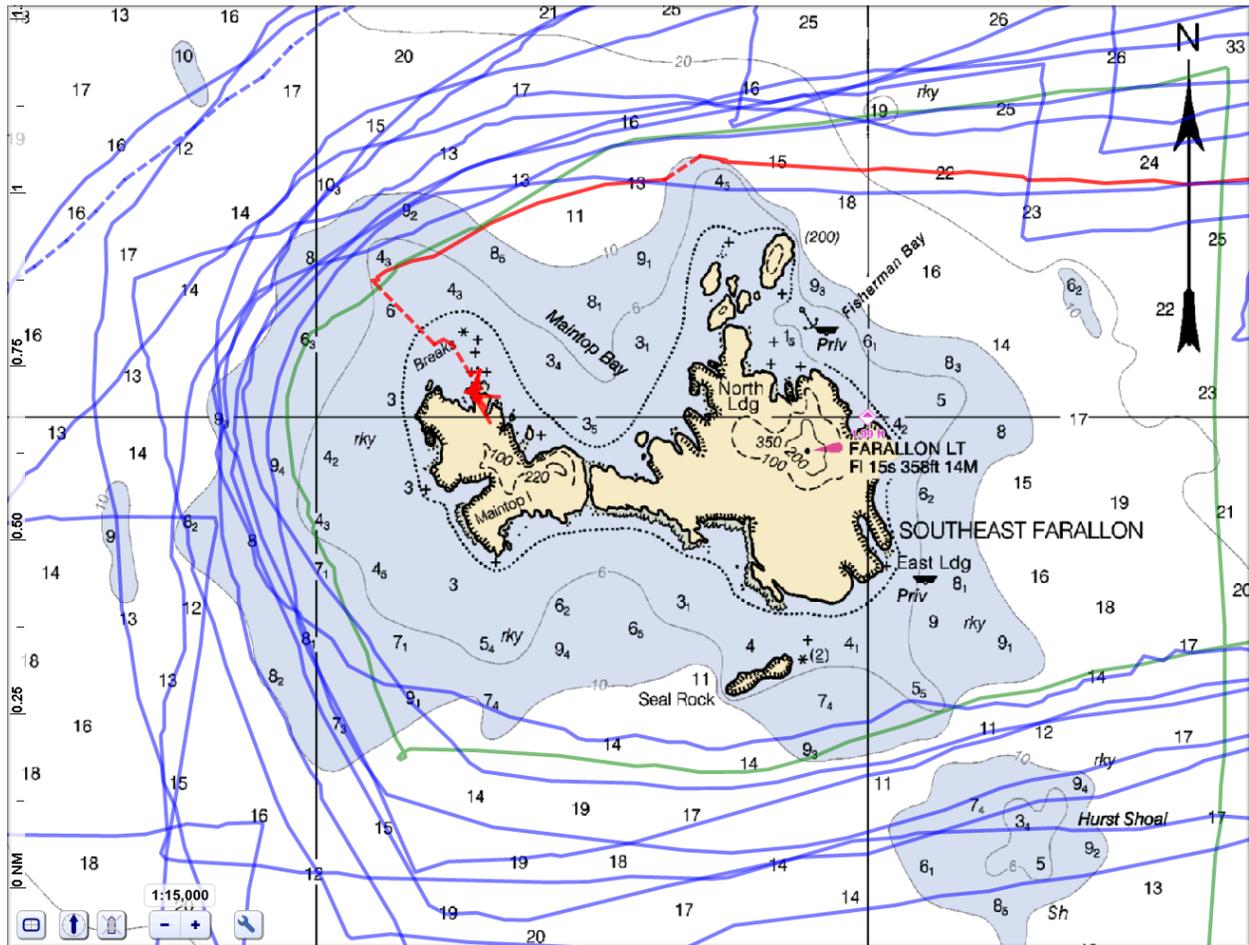


2012 Race Tracks

A total of 14 GPS tracks were obtained for boats that completed the 2012 race, representing about 40% of the boats that rounded the island. One is particularly interesting because it passes very close to the point where LSC was capsized, 11 minutes after that event and without mishap. That track is shown here along with LSC's track:

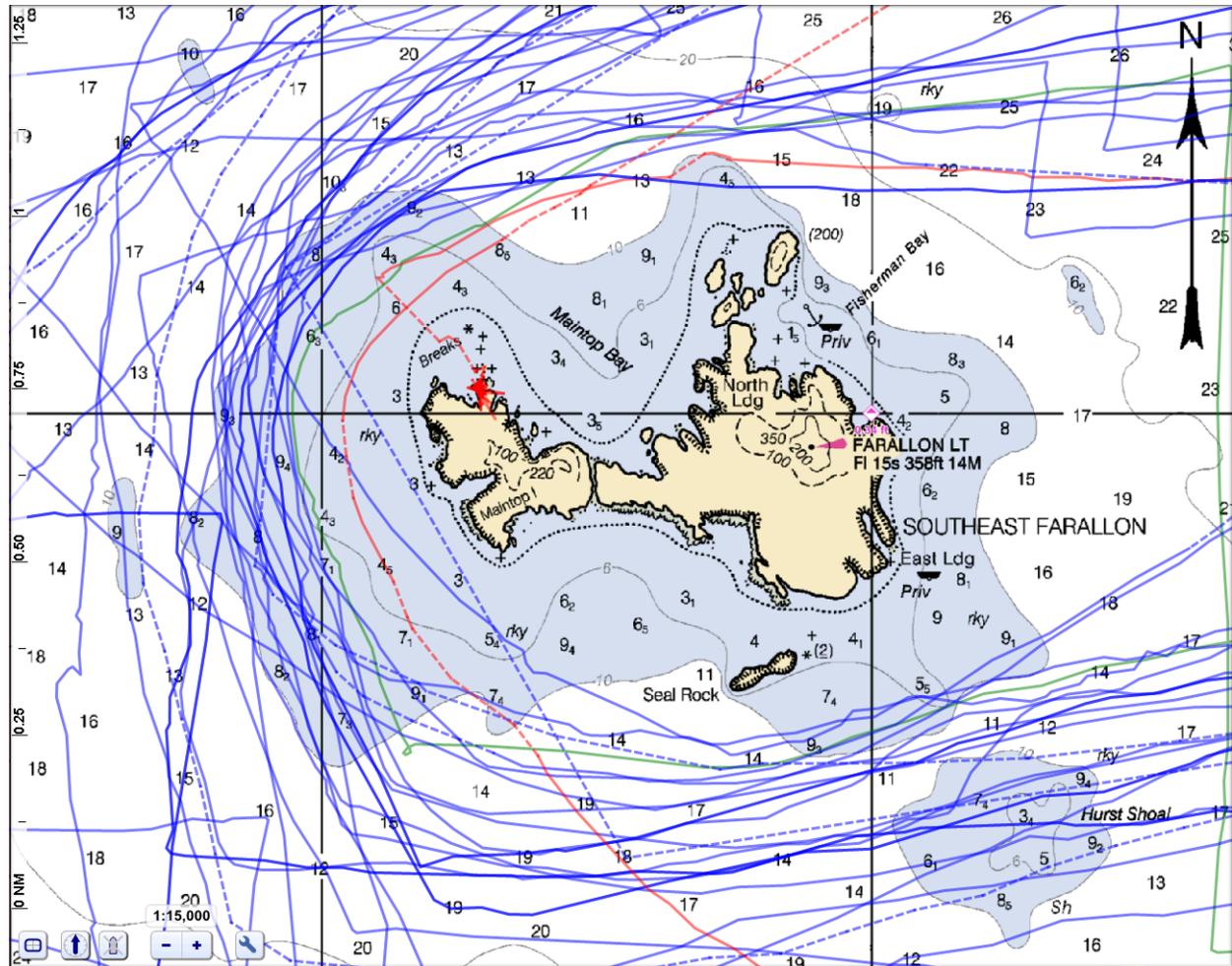


The following chart shows the 14 available tracks for the 2012 race. Of the 14, two tracks are inside the 4₃ fathom sounding at the NW corner. A third is just inside the 6-fathom curve, and another (different) track is inside a 4₃ fathom sounding at the NE corner.



2009-2012 Farallones Race Tracks:

The following chart shows tracks from various Farallon races (crewed, double-handed, and single-handed) from 2009-2012. The second red track is LSC's GPS track from the 2011 Full Crew Farallones race, also from Cahill's portable GPS. Again, most tracks are outside the 6-fathom contour.



Appendix K: Response from Questionnaire and Interviews

FC Farallones Race Questionnaire Returns

In May, US Sailing sent a questionnaire to all sixty entrants in the 2012 Full Crew Farallones race, requesting response to fifty questions on a variety of safety-related topics. The high number (30) of respondents shows how concerned the local racers are with the safety of their sport and their willingness to help make it safer. These are the results of those responses.

Statistics: Number of questionnaires sent, 60; number returned, 30

Of the 30 responses:

Number of finishers = 25.

Overall experience of crew: "Very Exp'd" = 9, "Exp'd" = 12, "Moderately Exp'd" = 8, "Novice" = 1

Crew sailed together in this boat: "Regularly" = 20, "Occasionally" = 6, "First Time" = 4

No one was surprised by the weather

All found the forecast accurate

Main source of weather included: NOAA, NWS, gribbs, sail flow, predict wind, windfinder.com

All but one checked the weather the morning of the race

Strongest wind seen ranged from 20 to 30+ kts

Highest waves experienced ranged from 8 to 16 feet

Ever out of control? Two boats reported "Yes"

Two (different) boats reported minor crew injuries

When asked who determined the rounding distance, 24 reported the skipper and 6 the navigator

Half the boats reported seasickness and fatigue

24 of the 30 boats had a crew safety briefing before the start

29 checked their safety equipment

All 30 crews donned lifejackets before the start

Safety harnesses donned: Before the start = 18, Inside the Bay = 1, Outside the Bay = 8, Never = 3

Jacklines deployed: Yes = 25, No = 5

Crew tethered? Prior to rounding the island = 18, While rounding the island = 1, Never = 11

Problems with PFDs? one false-inflation while sitting on the rail. One boat had no tether attachments.

Monitoring VHF channel 16? Yes = 21, No = 9

Aware of distress traffic? Yes = 22, No = 8

Heard radio traffic re: LSC incident? Yes = 22, No = 8

Saw LSC on the shore? Yes = 5, No = 25

Saw wave impact LSC? Yes = 1, No = 29

Was your boat equipped to ISAF/US Sailing Cat 2 requirements, all answered Yes

Are the Cat 2 regulations sufficient? Yes = 28, No = 2

Are the Cat 2 regulations burdensome? Yes = 4, No = 26

Finally, respondents were asked: What information could be made available to sailors to help them prepare for a similar event (say, at a seminar)? These are the answers:

1. Seminars, inexperienced crew need to be accompanied by persons with experience

2. I find the requirement for EPIRB to be not very useful unless a liferaft is also required. The emergency steering requirement is also somewhat excessive for this series.
3. Unexpected events happen very fast. So safety gear (tethers) should be used. It only works when in use and there is never time when it is needed.
4. We rounded the island to port. You are so eager to get to the rock that once you clear the NE tip it is easy to only focus on sailing to NW end of the island. In my opinion that course is only safe when the weather is a-typically calm. We had been watching the weather at the Farallones all week and knew the seas would be big and confused. We expected the breeze and seas to be stacked-up against the lee shore and knew the potential hazards. Our plan based on monitoring the weather conditions was to sail fairly close to the NE tip and then to overstand the NW tip. Based on actual conditions 2 miles west of the island (the swells were beginning to face-up and we were being headed) we switched gears and overstood both ends of the island. NE Farallones has some interesting landscape with respect to the reef, bottom contours, etc., that when combined with normal 'Farallon conditions', requires conservative judgment on the rounding. While I can read a chart, I would have benefitted by a knowledgeable explanation of how the bottom on the N side of the island changes so dramatically and how that would affect conditions.
5. Do a complete and comprehensive safety inspection of all rigging before the season starts. Do an inspection before each race. Test the boat with strong winds on the bay where the waves are small before going out the gate. Practice reefing when it is windy. Then go out the gate to see how the boat reacts with larger waves. The OYRA starts the season with a short race around the light bucket, usually followed by another short race, the Duxship race. (The Duxship and Farallones race were switched this year.) Do not make the Farallones race the first ocean race of the season. Don't be afraid to turn around and go home. Waves are more difficult than wind to deal with. Avoid the 4 fathom bank, you may see breakers. Pay attention to wave forecasts. Keep a radio available in the cockpit. Reef again! Observe the depth on the NW side of the islands, it gets shallow quickly. On most races I maintain a depth of at least 80 feet. On this race I stayed outside the 120 depth line, which added time but I am OK with that.
6. Adopt a protocol of requiring all crew to tether in past the GG Bridge.
7. Sharing the internal report findings. My recommendation is either a limiting buoy or gps coordinates to keep all boats at a safe distance. My yacht was the first boat around the island and we rounded very close but did not see the conditions experienced by some of the other crews. We either rounded in a light pattern or the conditions had degraded by low speeds rounding some 2 hours after us. We monitored 16 and first we heard of "pan pan pan" was 3 pm at this point we were inside Lands End closing in on the golden gate bridge.
8. It could be helpful to have a "skippers" packet available in advance of the race with a description of the course, tips, advice, hazards etc.
9. Don't round so close to the island considering the sea state that day just to win a pickle dish.
10. If you are too close to the island beware because the surf line extends north at the west end of the island. It is possible to all of a sudden enter that surf zone if you are too close. It nearly happened to me on my express 27 (El Raton) on a double handed race, and we were able to tack away. It is very deceptive. A virtual waypoint N and W could be set that all boats must clear.
11. At a minimum a recommended clearance distance or depth (probably more important) should be suggested best on forecast for the event. What should really be considered is an alternate course or two that include mandatory clearance way points.

12. Monitoring 16 is not easy in an open cockpit with 20+ knots of wind and sail noise to compete with. I heard traffic on 16 but could not make out any pan pan or mayday call. So plan ahead - wear a handheld.
13. Formula for estimating depth of water at which ocean swells break
14. Perhaps warning that the western sides of the SE Farallon Island is prone to unexpected/large and sometimes breaking waves in conditions when a swell is running.
15. Tether, tether, tether - all crew is empowered as individuals to tether when they want and suggest the rest of the crew does too (don't feel you have to wait for "someone in authority" to state its time to tether in).
16. Stay further away from breaking surf than you would expect. Be aware of possibility of unusual breaking waves.
17. The subject incident was very unusual - suggesting that no additional information was needed.
18. Advice on safety awareness. How to exercise and remain focused on effective judgment while in the heat of competition. Typical or potential hazards encountered in the specific event at hand. Testimonials from veterans of past events. Typical strategies used by veterans or a keynote speaker. Information that warns of complacency: my guess is that the shorter distance and closeness to home lure us all into thinking that nothing bad can happen. But this is still the ocean, where adequate preparation and caution must be exercised.

The SF YRA I think does an outstanding job organizing and publishing SIs and various other rules and Equipment Requirements that are quite appropriate to the events. And various other local sailing organizations do a fantastic job educating sailors on safety, equipment, communications, seamanship, etc. But *the YRA itself does not prior to the race organize a skippers meeting, which is where potential hazards, advice and other race day information could be discussed.* For ocean events I think this is a mistake. Pac Cup, Coastal Cup and SSS TransPac all have pre-race seminars, keynote speakers, safety and skippers meetings. We expect these for long distance races. But similar conditions, equipment failures, or accidents can occur even in the short distance races nearer to home. Granted, not everyone would attend, and such meetings themselves can't prevent accidents. But they can heighten awareness and encourage exercising sound judgment and seamanship.

On any given day the conditions at the Farallones can be as peaceful as a mirrored pond, or they can be boisterous and unforgiving. Part of the reward of racing around the islands is to navigate safely in whatever conditions are found. I don't think that specifying virtual marks (coordinates) necessarily makes a race any safer. Sound judgment has to be exercised regardless. So if I were to recommend a change, it would be this one thing only, my 2 cents, to hold various types of skipper's meetings:

- A) I would mandate attendance at a pre-season skipper's meeting, where various topics are covered, not the least of which is safety and equipment, and
- B) I would require that the YRA conduct voluntary pre-race and mid-season seminars on safety, tactics, equipment failure, weather, etc. I wouldn't change anything else. The educational content of such meetings and seminars would be helpful to many, and improve the safety of racing. And, I think, just merely offering the seminars would warn against complacency, and remind ALL participants to be adequately prepared.

19. Consider scenario-based preparations and planning (i.e. dismasting on the weather side of the Farallones, injured crewmember, etc.)

20. Seems clear that there needs to be discussion about pros (and possibly cons) of the use of tethers, and about the specific aspects on the Farallones topography (shallowness of reef, etc.) that is appreciated by many but certainly not all.
21. The importance of wearing your pfd always when sailing or racing in all conditions. The importance of having a crotch strap on an inflatable pfd/harness. The importance of tethering to the boat when offshore or in rough conditions. The importance of closing the main hatch and putting in the washboard when in waves that can come over the boat or roll the boat on its side.
22. Probably the SIs should state that the northern shore has shallow shoals which in high wind/wave conditions moves the breaking wave pattern out to 400-500 yards, so pass with caution.

Interview Response:

In addition to the US Sailing Questionnaires, the panel requested personal interviews with the three survivors and fourteen Farallones racers, many of whom had witnessed the capsize or ensuing grounding. All responded with an enthusiastic desire to help the investigation by giving their time and interpretation of the events. They all had deep concern for what happened and a commitment to help reduce the chance of a recurrence. The panel appreciates their valuable input.

Recommendations for Future Improvements from Interviews with Racers:

1. “Why were they not tethered aboard Low Speed Chase? They had jacklines on their boat and all hook in a couple miles out if on deck. They all used foam vest PFDs with separate harness for the most part. He suggested use of a “virtual buoy” off the shoal on Maintop Island to keep competitors out of the area.
2. Low Speed Chase was just too close. It was a miscalculation. Safety At Sea seminars would be good; it scares you. Setting a half mile perimeter on island may help; have a GPS track to show in case of protest. Use tethers around the island at a minimum. If you do go over, effecting a rescue is very dangerous. This boat will tether in in the future. All crew have a tether available, all wear a PFD. We use separate PFD and harness, if something happens. Crotch straps could be good, to prevent slipping over head – good idea.”
3. Inspections may be helpful. Mandatory jackline. (*Note from Interviewer: Jacklines are already required for the race.*) Having a harness and tether on would have been good. To not clip in because it is not convenient is not good. He said they were not clipped in on their boat, had no jacklines, and tethers were below. “Sailors can be lulled into taking greater risks with all of today’s devices combined with margins of error or random occurrences. They think they know down to a few centimeters where they are. People may feel too safe.” Race organizer should not lead a sailor into a situation where they can shave a few seconds and take risk.
4. “Really fun race, out to an island and around. Sometimes you make a mistake. Everybody else does the same thing rounding.” As for recommendations, smart people are always going to make recommendations. You could go within eighth of a mile. Obviously this race a quarter of a mile was not enough. You cannot say this distance for this weather condition, that distance for that. It was an accident.
5. Horrible miscalculation. They were good sailors trying to cut it too close. The system works, it was just a horrible situation. These were good sailors, who made a mistake. I always used to wonder why at

Race Meeting they did not explain more about what to do or expect in the race. The only time this happened was with Stan Honey for TransPac. A novice packet to help newcomers know what to expect could be an option. He does not think he needs tethers for crew in a race like this one; they are too much money.

6. Possibly the race could use a Limiting Buoy off the shoal. Use actual buoy placed by government on 10 fathom line off Maintop Point. Maybe the date of race should be in June, not April, for better weather. A storm had blown through a couple days before this year's race, so there was a bigger swell. Less storm activity, sea state activity in June. Fanny packs are not good for the ocean. Jay left the life raft on the dock. *(Note from interviewer: this was allowed for this race.)* Inspections may work and not be too onerous. Suggested making equipment list available easily. Lay equipment out on deck and photograph and initial boxes and check off, submit photos and list to Race organizers. This could help compliance. Alternate radio frequency should be established. Maybe use the bar pilots frequency. Radio training and awareness. How to make call. "There was not a rogue wave, several waves get together and the shoal is there off Maintop point."
7. Survivor: "If they had been clipped in, majority would have been ok but bruised. It is easier to help somebody if you are tethered to keep yourself safe." If a sailor over the side is wearing a PFD/Harness, it gives you something easier to grab to pull them aboard, than trying to grab just foul weather gear. "Percentage wise, coming off boat into the water was not a good thing." He wants to see it not happen again. "If I had known a wave like that could break that far out, I might have thought about it differently." He does not want lots more burdensome rules. "We need a cultural shift in skippers or experienced people. Add MOB drill; tethering strategies should be discussed. Start a dialog. People should discuss the pros and cons of life jackets. Everybody, crew included, need to think about life jackets. People rely on the skipper, but all sailors need to take responsibility for safety and PFDs. We view safety as an annoying checklist in sailing community." They were focused on break zone during the rounding. Now he knows there is a bigger set of waves that can come.
8. Survivor: "It was a freak accident; maybe a series of limiting buoys around island would help keep boats off. The first wave pushed us into the break zone. We were a quarter mile off the island. If the wave hit us a mile offshore we would have had time to take action before the boat hit the island. If we had been tethered in, probably lives would have been saved. If we ended up on the other side, it may have led to crushing and death between the boat and rocks. If we were further off we might have had time to save people." Would additional training help? "Maybe. Regardless of MOB training, there was no time once wave hit. All MOB gear was washed overboard."
9. Increase safety awareness. It is often overlooked. Is there a way to make it better? Maybe to drive a boat you have to take a course, and you have to talk to your crew about safety before going out on the water. Raise awareness and knowledge.
10. "It scares the shit out of me to see where we were. In the past we did not look at depths. I would look at depths in the future. Waves pile up on rocks. A hundred feet of water is not a problem. Off the Potato Patch you see the same thing with waves." Suggestions: 1 – May be hard to enforce but try a rule that say you have to stay 2,000 feet offshore. 2 – In the ocean you will have your tether attached to jackline under certain conditions. Winds over 20, waves over ten; then you have to hook in. "If crew on Low Speed Chase had tethered, less people would have died." "It is too hard to watch the depth. Some boats do not have a depth sounder."
11. "We like the race. We will race next year. A skipper makes 1,000 decisions in a race, Low Speed Chase made one poor decision. Maybe it should say in the Sailing Instructions, if seas and winds are up,

watch your clearance on the island, waves can be within 200 – 300 yards of the island.” “If not for this incident, it would have been the best sailing day. Crew said, ‘If there is wind up, then there are breakers at the Farallones.’ That one sentence in the Sailing Instructions could make a difference. A warning line in Sailing Instructions or a minimum distance off required. Knowing this now, we would have stayed further out.”

12. “Low Speed Chase must have been a well-made boat to come through as she did.” They should keep the Farallones race a little later in the season. It was a known fact a storm had been through a few days earlier leaving swells. In June you are less likely to get those conditions. One crew said he has started wearing a life jacket. On their boat, the two point guys were tethered, others were not. “We will think about a tether strategy for the future. Our take is staying on the boat using a tether would have been the thing to do for Low Speed Chase.”
13. This is an awful incident for Low Speed Chase and the sailing community. “Maybe for the Farallones Race, in the Sailing Instructions or Skipper’s Meeting have something that covers dangers of going around the island. Maybe something that calls out clearly what the dangers are, sailing too close, there is a breaking wave zone. People should ping their GPS to their distance off when rounding. Know you were 1,400 feet or 2,000 feet from the island. Be aware of not just rocks but breaking waves. Ping a virtual mark, or offset mark. Keep people away from a high risk area. Spot check the ping/position data from random yachts. Makes people think.” “I think safety requirements are very well thought out and not egregious. One might not want more than required. The racing community since Fastnet has done good job of making people aware and safe.” “Would having Coast Guard radio on station at the island during the day of the race be good?”
14. Survivor: “If we had not been there at that time. There seemed to be a wave there that was bigger than the rest of them. But that sort of thing can happen there, deep water shoaling to shallow, waves bouncing off the island. I have talked to people who seemed to think they had taken that line themselves.” “Maybe a crotch strap might have helped, I don’t know. When you end up in breaking waves on the rocks it is hard. I can’t think of anything else, you get in the boat and brace yourself as you go up. Bryan thought it was about it for him at the end trying to get up the rocks. It happened so fast. You can’t climb steep rocks. That is pretty much what I know.

Appendix L: Panel and Advisor Biographies

The panel investigating the Low Speed Chase capsized and ensuing deaths at the Farallon Islands comprised five panel members and five advisors. The panel members were Sally Lindsay Honey, chair, Bill Barton, Jim Corenman, John Craig, and Bartz Schneider. The contributing advisors were Dr. Kent Benedict, Chuck Hawley, Jim Wildey, Evans Starzinger and Dr. Michael Jacobs.

Sally Lindsay Honey

Sally Lindsay Honey of San Francisco, Calif. is a member of US Sailing's Safety-at-Sea Committee. This two-time winner of US Sailing's Yachswoman of the Year award (1974, 1973) has logged over 35,000 ocean miles, double-handed and fully-crewed, including seven Farallones Races, two Transpac Races, four Pacific Cups, two Bermuda Races, a Transatlantic Passage, and a Chicago Yacht Club Race to Mackinac, in addition to extensive cruising on both coasts, the Caribbean, and the South Pacific. She also campaigned in 5-0-5 and other one-design classes at the national and world class levels for twenty years.

Honey is a life-long sailmaker, working for North Sails for four years before starting her own business. She was the owner and president of Precision Technical Sewing and Spinnaker Shop in Palo Alto, Calif. from 1979 to 2007. The business specialized in sailmaking, marine canvas, and industrial sewing for the aerospace, electronics, medical, and exhibit industries.

Bartz Schneider

Bartz Schneider is a retired business executive with 40 years of management experience. He is an active one-design racer, a member of the San Francisco Yacht Club, and the Fleet Captain of the Express 37 Fleet in San Francisco. He is a certified National Race Officer, the US Sailing Area G Director, former Area Race Officer, and previously a member of the Olympic Sailing Committee. Schneider has served as Principal Race Officer for a number of sailing events including the San Francisco Yacht Club Leukemia Cup for five years, and numerous Pacific Coast, National, North American, and World Championships. He has also competed in six Chicago Mackinac races, six Coastal Cups, and one Pacific Cup, and many Lightship and Farallones races, both double-handed and crewed, all as skipper.

Jim Corenman

Jim Corenman's background is engineering (BSEE from Berkeley) in electronics, computing and mechanical and optics design in the medical field. He sailed on San Francisco Bay from the mid-1970s until 1992, including numerous ocean races to Hawaii and deliveries or cruises back, on a variety of boats from 30 to 50 feet, and many coastal races. Jim was Commodore of the Pacific Cup Yacht Club, technical chairman for three races, and with his wife and partner, Sue, published the "Pacific Cup Handbook" in 1990.

In 1992, Jim and Sue sailed west with their Schumacher 50 on a nine-year circumnavigation by way of the South Pacific, the Indian Ocean, the Med, the east coast, Hawaii and Alaska, all double-handed. They now live in Friday Harbor, sail and cruise in the Pacific Northwest, and are members and past commodore of the San Juan Island Yacht Club. Currently a member of the Safety at Sea committee, Jim has conducted numerous seminars on weather and communications at Safety at Sea seminars. Together with Stan Honey, Jim developed the Sailmail network to provide email communications for offshore sailors. Jim also developed and operates the Saildocs weather server, a major source of weather information for offshore sailing.

Bill Barton

Bill Barton has served as Principal Race Officer for many events and as Race Committee Chairman of the Manchester Yacht Club for four years. He was also an offshore delegate to Mass Bay Sailing, the Regional Sailing Authority to US Sailing. Bill has spoken at US Sailing Safety-at-Sea seminars on the topics of race preparation and Offshore Special Regulations. As a lifelong and avid sailor, he has cruised extensively from the Caribbean to the ice-strewn coast of Labrador and across the Atlantic. Barton has competed in numerous Newport Bermuda Races and Marblehead Halifax Races since his teenage years as either a captain or navigator. For fourteen years, Bill has served on the Newport Bermuda Race Organizing Committee, both as Chair of inspections and safety for the event, and as Chair of the Committee. Today, Bill is the Commodore of the Manchester Yacht Club in addition to working as a consultant in information technology.

John Craig

John Craig is a member of US Sailing's Board of Directors, and is an accomplished Race Manager and Coach. He is currently the Principal Race Officer for the 34th America's Cup. Craig started out as a Provincial Coach for British Columbia Sailing with a special interest in junior program development. Craig served as Race Manager for the St. Francis Yacht Club for over 12 years. St. Francis Yacht Club operates an aggressive and innovative program on San Francisco Bay. Craig has managed and operated everything from Optimist regattas to Star and Melges 32 World Championships to the famed Big Boat Series. Throughout his career, he has worked closely with many of the top sailors in the world, and continues to work with many international sailors at the highest levels of the sport.

The panel is grateful for the contributions from the following advisors:

Dr. Kent Benedict

Dr. Kent Benedict is a licensed physician and surgeon in the state of California, where he first received his license in 1970. He is licensed by the US Coast Guard as a Ship's Surgeon and Staff Officer, and a Ship's Master. In terms of sailing experience, Benedict was the Deck Instructor and Chief Medical Officer of the US Training Ship Golden Bear for 22 years, has served as a Charter Captain for trips to Belize, Sea of Cortez, Mexico, Baja California, the West Indies, the Grenadines, and the British Virgin Islands. Additionally, he has 25 years of experience in participating in multiple short and long distance trans-oceanic races and deliveries as both a skipper and a crew. Furthermore, Benedict has worked as a Lecturer and Safety-at-Sea Instructor for seven years.

Chuck Hawley

Chuck Hawley has sailed over 40,000 miles on vessels ranging from ultra-light "sleds", to singlehanded sailboats, to the maxi-catamaran PlayStation. His voyages include two singlehanded passages to Hawaii, three crewed Transpac races and a world record attempt on the west to east transatlantic record. As Chairman of US Sailing's Safety-at-Sea Committee, Hawley has moderated more than 50 US Sailing Safety-at-Sea Seminars since 1990. He is also a powerboat instructor for US Sailing. Hawley has participated in extensive research into crew overboard recovery, life raft design, anchor design, and storm tactics. He has served on the American Boat and Yacht Council Technical Board of Directors, the Transpacific Yacht Club

board, and the Pacific Cup Yacht Club board. Hawley is a staff Commodore of the Santa Cruz Yacht Club. Currently, he is the Vice President of Product Information at West Marine.

Jim Wildey

Jim Wildey received a Bachelor of Science degree in Metallurgical Engineering from Virginia Polytechnic Institute in 1975. In 2009, he retired from the National Transportation Safety Board (NTSB), where he worked as a National Resource Specialist in materials failure analysis and materials engineering. He is a recognized national and international expert with a high level of technical knowledge in transportation safety related to design, certification criteria and failure analysis of components involved in transportation accidents; corrosion, fracture, and fracture mechanics; metallurgical testing and examination techniques and methodologies; the properties of metals under a wide variety of conditions and the determination of the sequence of failure of complex transportation structures. Wildey has played major roles in the structural and failure analysis aspects of investigations of a wide range of aviation, maritime and other transportation-related accidents, including an investigation with NASA on the Space Shuttle *Columbia* accident in 2003.

Evans Starzinger

Evans Starzinger of Milford, Conn. has recently retired as the CEO of North Thin Ply Technology. He brings 15 years of offshore sailing experience to the table. This includes circumnavigating the globe two times, sailing to five of the great southern capes, and to both the Arctic and Antarctic ice packs. Starzinger is a member of the US Sailing Offshore Special Regulations and Planning and Studies Committees. The combination of his vast knowledge of offshore sailing, and his numerous dealings with difficult business problems, makes him a perfect addition to this panel.

Dr. Michael Jacobs

Dr. Michael Jacobs received his Medical Degree from SUNY Downstate Medical Center in 1967, and is on the Medical Staff at Martha's Vineyard Hospital. Not only has Dr. Jacobs served as a physician for the coast guard, but he has also served as a physician on board three separate voyages that reached Australia's Great Barrier Reef, the Islands of Papua New Guinea, Antarctica, Alaska, the South Pacific, and the Line Islands. In terms of published works, Dr. Jacobs is the author of a chapter of "Survival at Sea", and is a co-author of "A Comprehensive Guide to Marine Medicine". Additionally, he has written articles for Sail Magazine, Cruising World, Paddler, and the Wilderness Medical Society News Letter. He has been a speaker at Safety at Sea Seminars for 15 years.