Naval Safety Center FY12 Annual Report

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1. Introduction and Overview

Assessing a single fiscal year can be a complex proposition, but it is a crucial process as we chart priorities for the following year. Trends aren't necessarily apparent, and short-term trends may be misleading in the long term. For these reasons, the following annual report offers a variety of measures of FY12.

In terms of statistical measures, the following report displays the year's mishap data for the Navy and Marine Corps, focusing on the major mishap-reduction targets, such as traffic and aviation. We compare FY12 with FY11, then with five-year averages, and finally with both 10-year and 20-year periods. Interesting and informative patterns appear, suggesting areas where increased or adjusted mishap-prevention efforts are necessary. The short-term focus is on corrective actions—issues on which we can work together to identify and avoid preventable mishaps.

Another major section of this annual report is a snapshot of the recurrent discrepancies that our safety-survey teams found during their hundreds of in-depth fleet visits around the globe. These nuts-and-bolts details of unit safety programs highlight shortfalls in fleet knowledge, training, experience and execution.

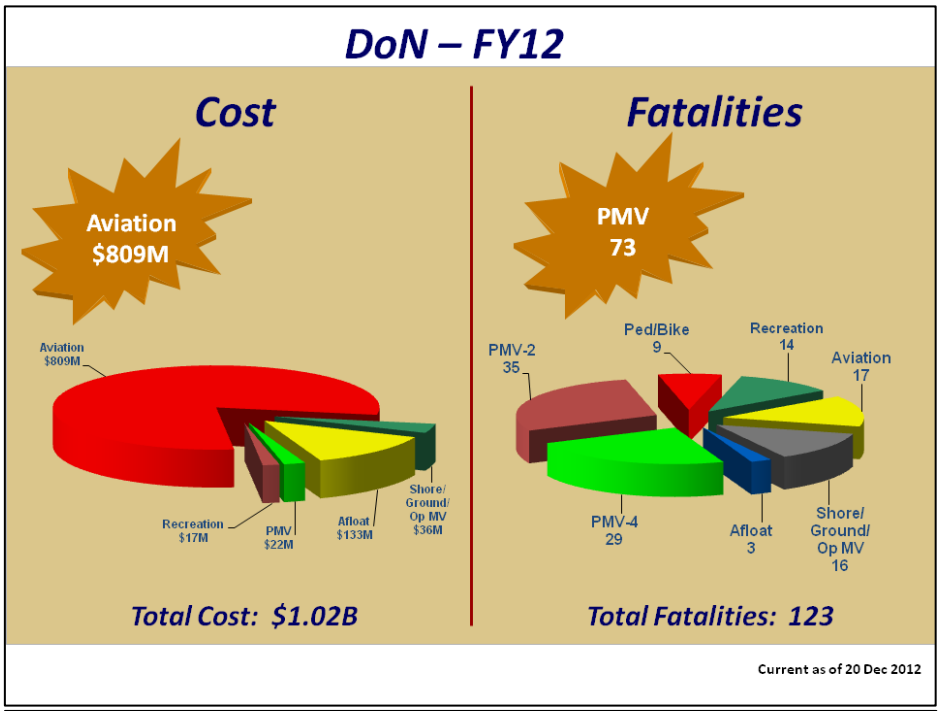
A major section of this report focuses on traffic safety, especially motorcycle mishaps and the importance of training. Included are the results of our new surveys of traffic and recreation/off-duty safety programs, and the series of motorcycle symposia that we held during FY12.

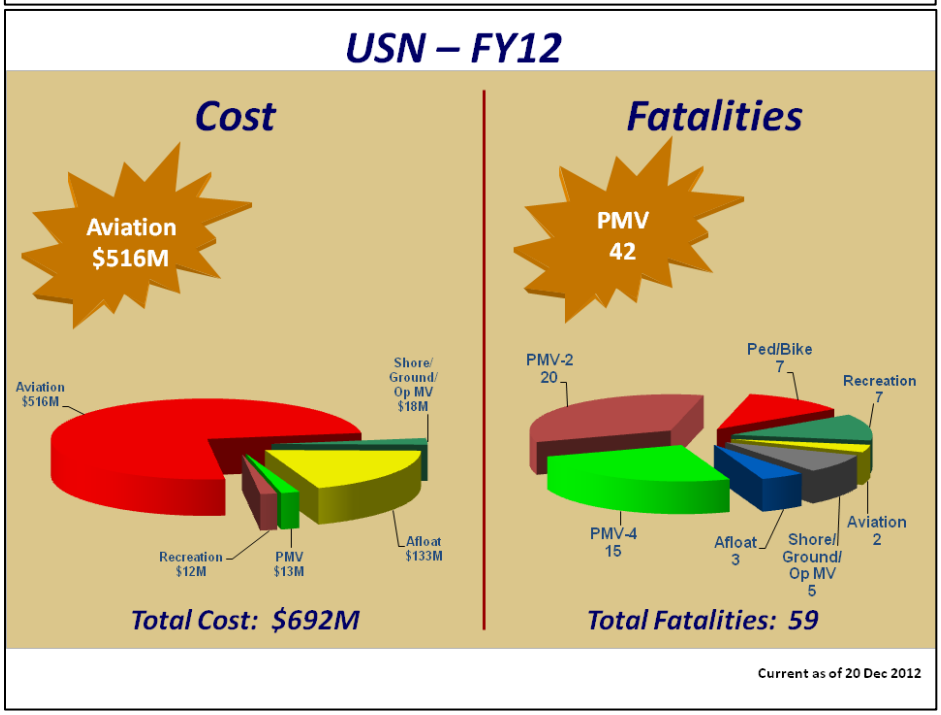
Finally, we include information on special topics that came to the fore during FY12, such as human factors, negligent discharges of firearms, parachuting and combat-zone electrocutions.

2. FY12 End-of-Year Statistical Summary

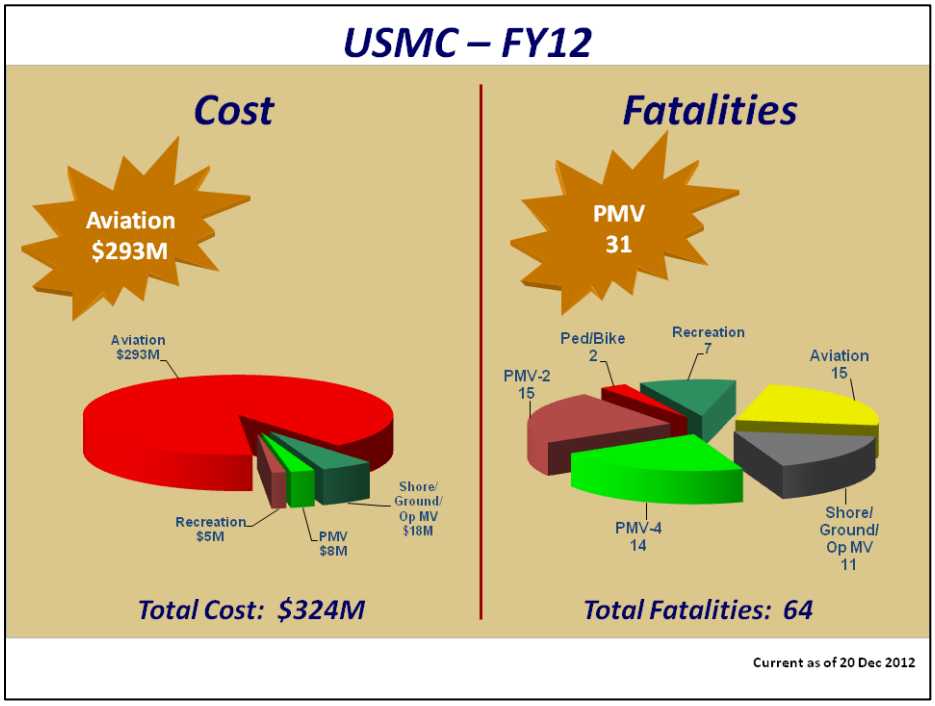
FY12 Mishap Costs and Fatalities

These three charts give a quick snapshot of the human and financial costs of mishaps during FY12.



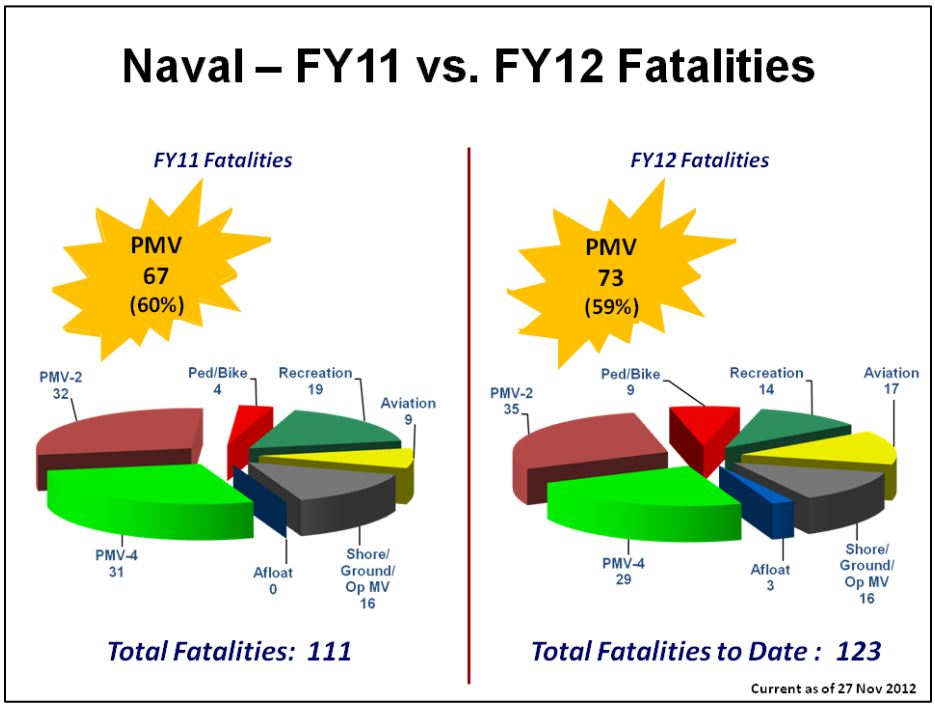


As always, the big dollar losses are in aviation, and the largest number of fatalities are in traffic.

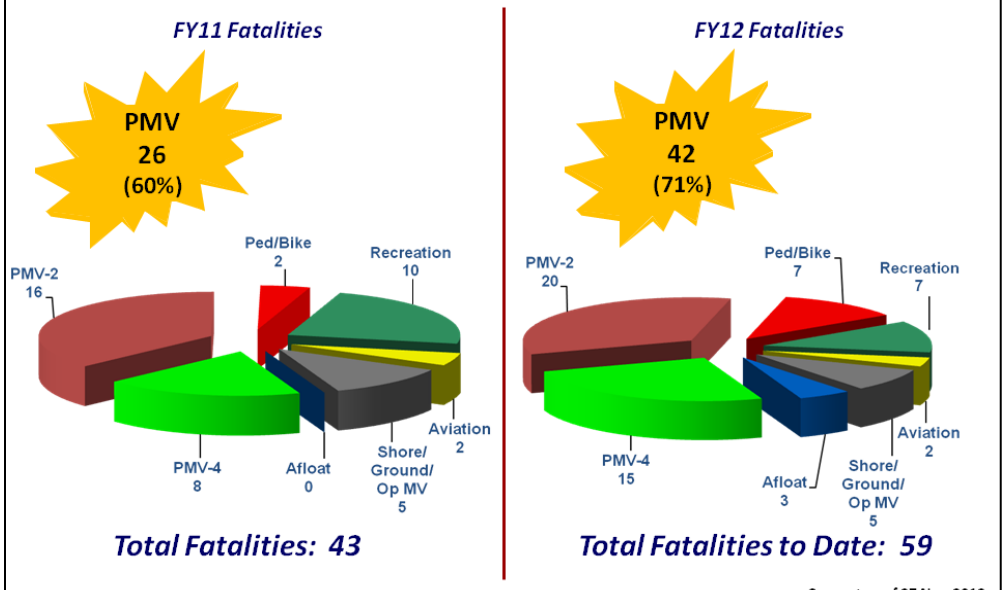


FY11 vs. FY12 Fatalities

The next three charts compare FY12 with the previous fiscal year. Note that this comparison depends to some extent on whether FY11 was a comparatively "good" or "bad" year.



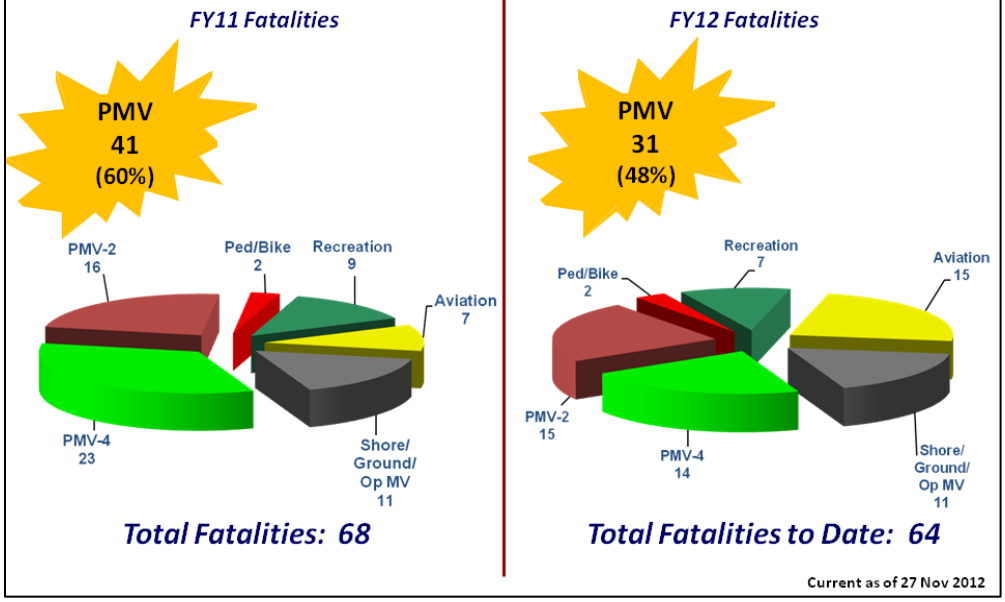
USN – FY11 vs. FY12 Fatalities



Current as of 27 Nov 2012

Increases in both PMV-2 and PMV-4 combine to make overall Navy PMV fatalities an even more dramatic percentage.

USMC – FY11 vs. FY12 Fatalities



Current as of 27 Nov 2012

Conversely, the Marine Corps saw decreases in both PMV-2 and PMV-4.

Mishap and Mishap-Rate Comparisons, FY12 vs. FY11 and 5-Year Average

Comparing a single fiscal year with the 5-year average offers a more accurate view of trends.

Mishap Category	FY12 vs FY11	FY12 vs 5 Yr Avg
Navy		
Class A Flight Mishaps	3%	-8%
Class A Afloat Mishaps	0%	-31%
Class A Shore On-Duty Mishaps	-66%	-78%
PT Fatalities	53%	19%
Class A On-Duty MV Mishaps	-33%	29%
Total Class A On-Duty Mishaps	2%	-13%
On-Duty Military Fatalities	45%	-33%
PMV Fatalities	64%	2%
PMV 4 Fatalities	91%	-28%
PMV 2 Fatalities	27%	9%
Off-Duty/Rec Fatalities	-28%	-44%
Civilian Lost Work Days (Thru 25 AUG 12)	2%	-3%
Military Lost Time Cases (Thru 30 SEP 12)	-9%	-8%
Marine Corps		
Class A Flight Mishaps	-11%	13%
Class A Ground On-Duty Mishaps	63%	6%
PT Fatalities	100%	66%
Class A On-Duty MV Mishaps	53%	-10%
Total Class A On-Duty Mishaps	2%	-3%
On-Duty Military Fatalities	47%	44%
PMV Fatalities	-23%	-34%
PMV 4 Fatalities	-38%	-48%
PMV 2 Fatalities	-4%	-11%
Off-Duty/Rec Fatalities	-21%	-44%
Civilian Lost Work Days (Thru 25 AUG 12)	-39%	-32%
Military Lost Time Cases (Thru 30 SEP 12)	0%	-8%

Compared to the 5-year average, the Navy saw positive trends in 8 of 13 categories.

The Marine Corps saw positive trends in 8 of 12 categories.

Off-duty fatalities increased from 36 in FY11 to 48 in FY12. They basically held steady at about 83% of total mishap fatalities, which increased from 43 in FY11 to 58 in FY12. An increase in PMV fatalities from 26 in FY11 to 42 in FY12 was the central factor in this increase.

For PMV fatalities, which are year-to-year consistently the largest percentage source of Navy mishap fatalities, FY12 had negative trends from FY11 in all three of its subsets: PMV-4, PMV-2 and pedestrian/bicycle. However FY12's PMV-4 fatalities (even with a 91% increase from FY11) were still the second lowest year in history, as well as 28% below the previous 5-year average.

Pedestrian/Bike deaths spiked from 2 in FY11 to 7 in FY12 for the highest fatality rate in this area in 25 years. The fatalities had little correlation, so this spike in FY12 is potentially the reflection of outside factors that appear as a periodic randomness in the data.

Of the three components of PMV, PMV-2 is of most statistical concern. Contrary to most other safety data which have 20-year decreasing fatality trends, PMV-2 is showing an upward trend in this area, as well as over the last three years (13 in FY10, 16 in FY11, and 20 in FY12). PMV-2 fatalities in FY12 are up 27% from FY11 and 9% from the 5-year average. About 60% of the riders killed had not completed all required motorcycle training. Critical factors analysis of these PMV-2 fatalities shows a significant trend for human factors errors involving speed, fatigue and loss of control.

PMV-2 is of most statistical concern. Contrary to most other safety data which have 20-year decreasing fatality trends, PMV-2 is showing an upward trend.

As part of the overall mishap-fatality increase from 43 in FY11 to 58 in FY12, another area of notable increase was the 45% increase in on-duty military fatalities from 7 in FY11 to 10 in FY12. However, the FY12 on-duty military fatalities were still 33% below the previous 5-year average.

Due to the comparisons being rate-based, with a force that is getting smaller, similar mishap counts result in higher rates. An example of this sort of moderately higher mishap rate in FY12 is Total Class A on-duty mishaps (2% increase).

In other areas, small numbers of fatalities result in large percent changes. FY12's 3 PT fatalities resulted in a rate that was 53% above FY11's 2 fatalities and 19% above the previous five year's average, just as FY12's improvement to two Class A on-duty MV mishaps was a 33% decrease from FY11's three.

Other improvement areas include Class A shore on-duty mishaps 66% reduction to one in FY12 from three in FY11 and off-duty/recreational fatalities being reduced 39% to six in FY12 from 10 in FY11. Another area showing consistent superior performance even if it is relatively flat from FY11 to FY12 is the afloat Class A mishaps, which have held steady at their historically second lowest rate of five for three years from FY10 through FY12, as well as being five for four of the last five years when FY08 and FY09 are included.

On-duty areas of concern center around the continuing high percentage (about 60%) for human factors as a cause of naval aviation mishaps, as well as recently reviewed evidence that similar human factors issues at a similar rate are responsible for aviation-maintenance mishaps and at an even higher rate (90%) for afloat mishaps for FY11 and FY12.

Additional on-duty concerns for 2012 include the Navy's having its first ever Class A Unmanned Aircraft System (UAS) mishap, followed by two more. With these mishaps costing a total of $67M, this will likely be an area of concern for future risk exposure. Also of future concern is the potential leading indicator of Class B mishaps increasing 50% from 10 in FY11 to 15 in FY12.

With mishaps involving Unmanned Aircraft Systems costing a total of $67M in FY12, this will likely be an area of concern for future risk exposure.

Overall mishap cost for material and personnel/injuries in FY12 was $692M. This is greater than FY11 and FY 10, but par with FY09 and FY08 (the average for these five years was $503M). When compared to the SECDEF's mishap goals, FY12 was not the best year in any of the four metric categories, but still showed significant improvement in three of the four.

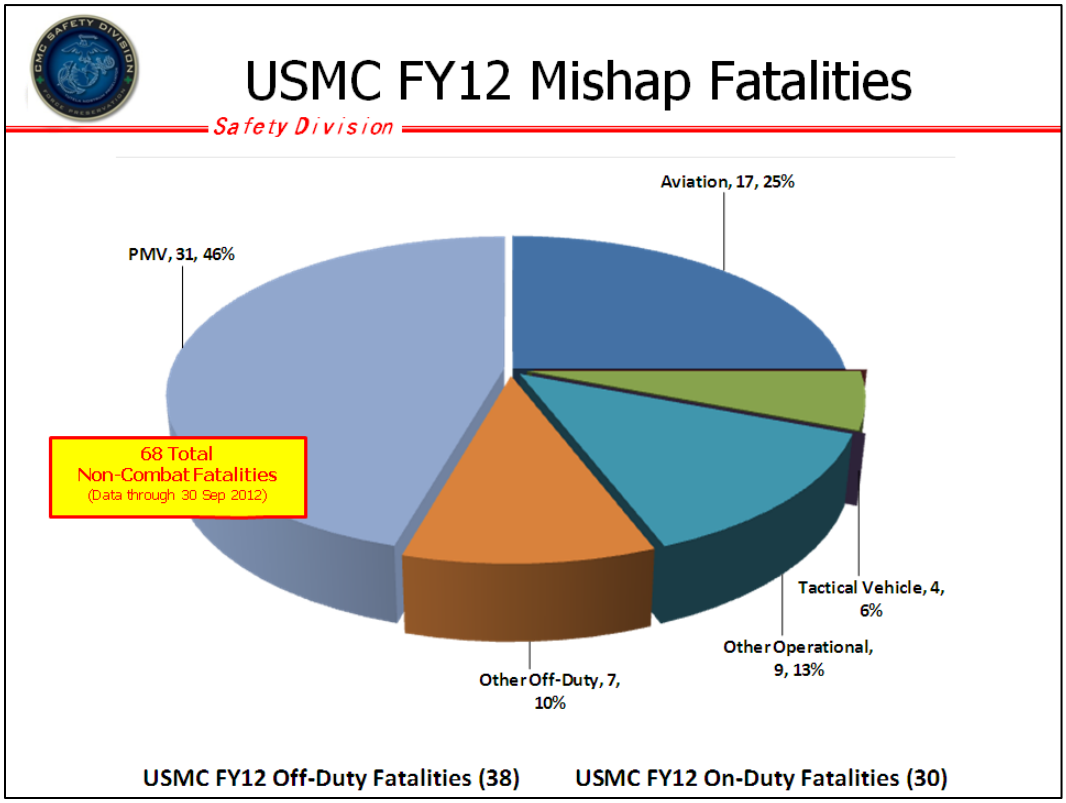
USMC FY12 Mishap Summary

- Aviation: 60% Class A flight mishaps (FM) decrease from FY02.
  - FY12: Six Class A FMs, 0 Class A flight-related mishaps (FRMs)/aviation ground mishaps (AGMs).
  - FY11: Seven Class A FMs, 2 Class A FRMs, 2 Class A AGMs.
  - Ground: 78% Class A increase from FY11 (16 mishaps in FY12, 9 in FY11).
- Recreational: 36% decrease in fatalities from FY02.
  - Best year ever for the Marine Corps with only seven deaths.
  - Five-year average (FY07-11): 13 deaths.
  - PMV-4: 72% death decrease from FY02 baseline (FY12-14, FY11-23).
  - PMV-2: 36% death increase from FY02 baseline (FY12-15, FY11-16).
- Pedestrian: 2 deaths.
- Aviation
  - Three occurred during training exercises on the range.
  - Three occurred OCONUS.
- Ground
  - Increase in mishaps from previous year was due to five electrocution mishaps in-theater and four PT mishaps. Last PT mishap occurred in FY09.
- Recreational
  - One personal aircraft, one firearm, one bicycle, four swim/dive.
- PMV-4: 72% decrease in deaths from FY02 baseline.

FY12 was the best year ever for Marine Corps recreational fatalities.

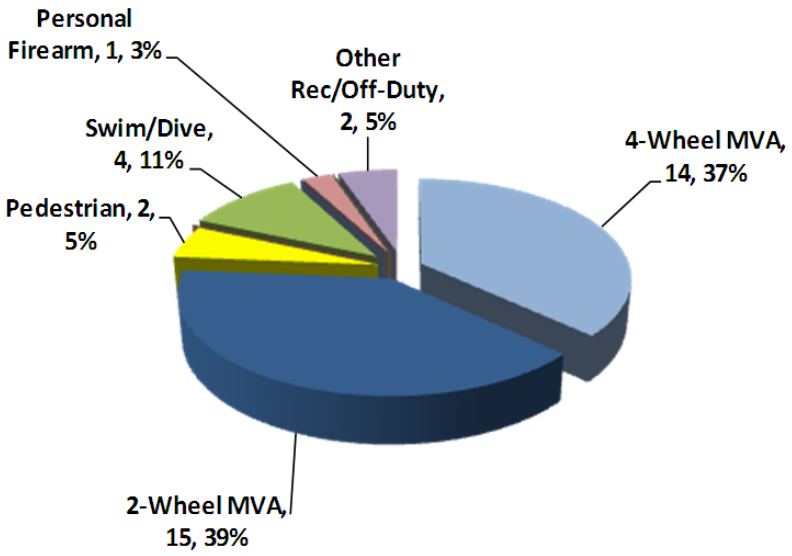
  - FY12: 14 deaths (39% decrease from previous year).
  - FY11: 23 deaths.
  - Mishap cause factors included: Alcohol; losing control and crashing into another vehicle or stationary object; fatigue.
- PMV-2: 36% decrease in deaths from FY02 baseline.
  - FY12: 15 deaths (6% increase from previous year).
  - FY11: 16 deaths.
  - Mishap cause factors included: Alcohol, excessive speed, lack of training (four had zero training), and lack of skills (five had Level 1 training only).
  - Majority of motorcycle riders wore PPE.
  - Four mishap riders were on cruisers.
  - 11 mishap riders were on sport bikes.

11 of 15 Marine Corps motorcycle fatalities involved sport bikes.



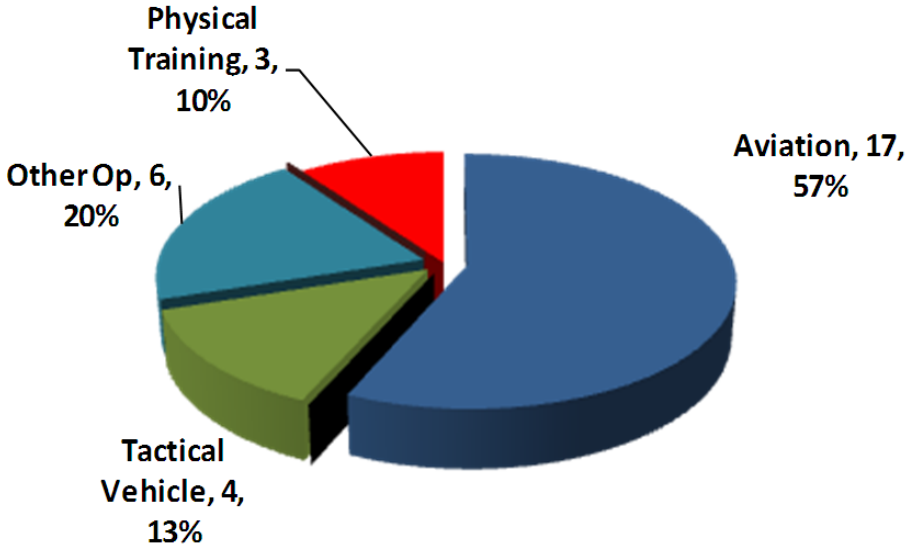
USMC FY12 Off-Duty Mishap Fatalities

Safety Division

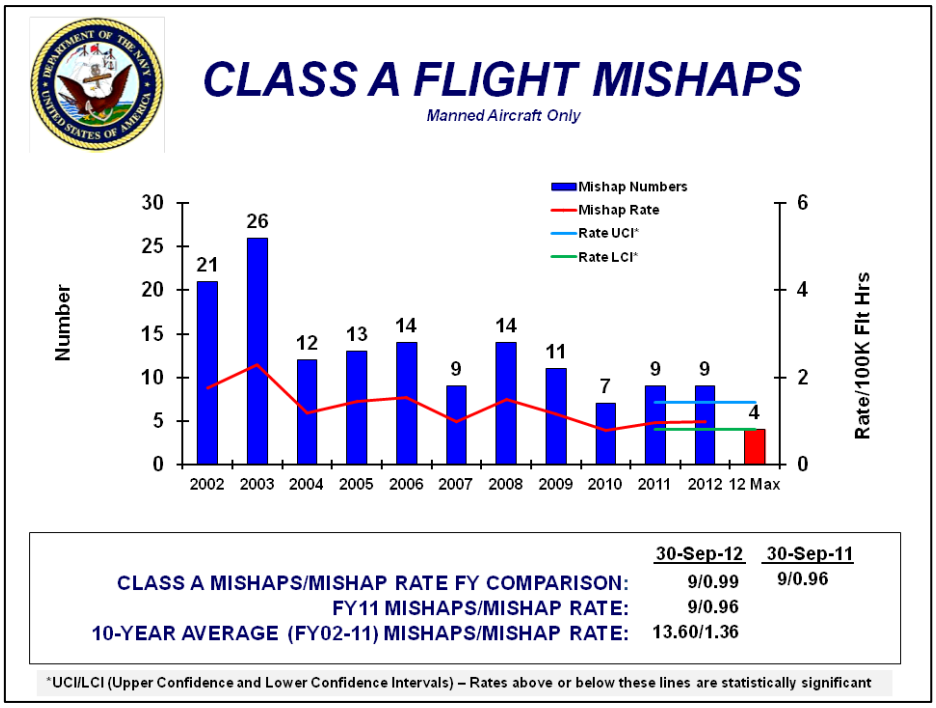


FY12 USMC On-Duty Fatalities

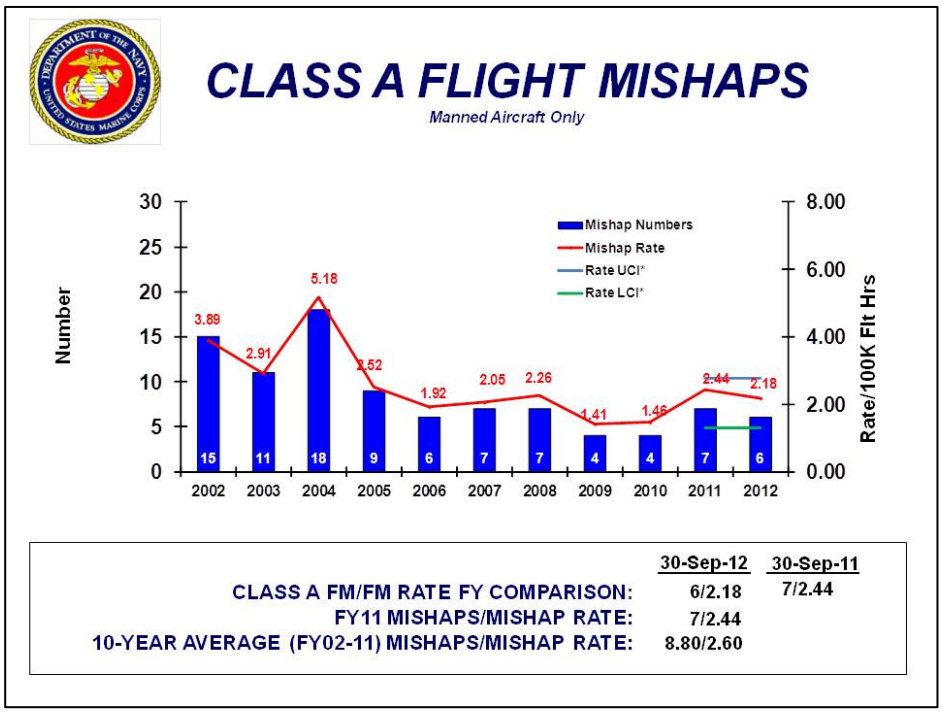
Safety Division



3. Aviation



Navy Class A flight mishaps continued a slight upward trend (not statistically significant).



Marine Corps Class A flight mishaps returned to the pre-2009 plateau.

Aviation FY-12 Class A Mishap Summary

- 2 Nov. T-45C ejection after loss of engine power.
- 21 Dec. MH-60S crashed in Mountain LZ.
- 19 Jan. CH-53D crashed during night ops in Afghanistan. 6 Fatal.
- 23 Feb. AH-1W and UH-1Y crashed shortly after takeoff. 7 Fatal.
- 24 Feb. F/A-18F on day training flight, aircrew ejected.
- 31 Mar. MQ-8B Fire Scout failed to sync with landing system at sea.
- 6 Apr. MQ-8B crashed in Afghanistan.
- 6 Apr. F/A-18D crashed into apartment complex in Virginia Beach, VA.
- 11 Apr. MV-22 crashed after takeoff from LZ in Morocco. 2 Fatal.
- 30 May. T-45C crashed during day training flight.
- 11 Jun. RQ-4 Global Hawk crashed into swampy area near Patuxent River.
- 29 Jun. MH-53E destroyed after engine caught fire in flight.
- 19 Jul. MH-53E crashed during heavy lift operation. 2 Fatal.
- 25 Jul. AV-8B crashed after engine malfunction.
- 22 Aug. MH-53E hard landing after takeoff.
- 29 Aug. UH-1Y crashed in Afghanistan.
- 1 Sep. F/A-18C crashed after pilot ejected due to dual bleed air leak.
- 4 Sep. C-2A drifted right on a hook-skip bolter striking its starboard wing on the port wing of an E-2C on CAT 2.

Unmanned Aircraft System mishaps are considered Class A, B or C mishaps under the same criteria as manned aircraft, but they don't count against our mishap rates. A major reason is that we do not have enough historical flight hours on them yet to weave them effectively into the manned mishap stats. DOD may require us to do so as early as next year.

- 18 mishaps – 15 manned, 3 unmanned
- Fixed wing – 7, rotary wing – 7, tilt rotor – 1, UAS – 3
- USN – 12 (9 manned, 3 unmanned), USMC – 6
- 19 total aircraft – 1 mid-air (AH-1 / UH-1)

The 3 FY12 mishaps involving Unmanned Aircraft Systems don't count against mishap rates yet, but DoD may require it in the near future.

FY11 and FY12 Class A "Characterizations" and Human Factors

Factors leading up to mishaps:

- Material Failure only
- Maintenance Factors only
- Aircrew-related Human Factors (Aircrew Error)
- Maintenance or material factors followed by Aircrew-Related Human Factors (Events where aircrew-related human factors errors follow maintenance or material failure are ultimately characterized as Aircrew-related HF events)

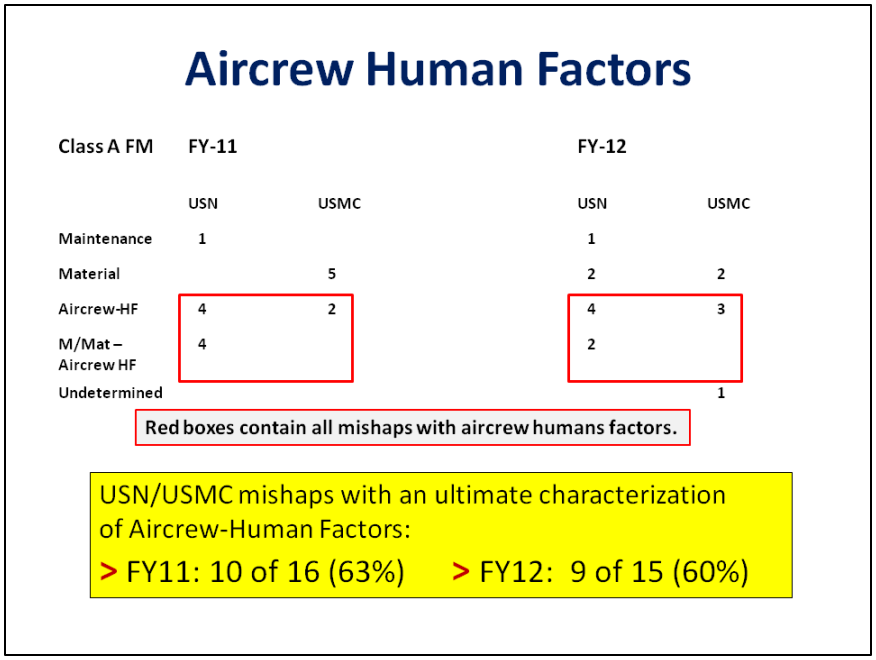
- FY11 and FY12 – Majority of Class A mishaps characterized as Aircrew-Related Human Factor related.

Note that "characterizations" are not the same as "cause factors."

The challenge is to address aircrew/human factors-related causal factors in a way that will reduce their frequency from the majority of mishaps. We have to recognize that the reason "aircrew-related" human factors are increasing is based on a number of possible contributing factors. Our mission sets and optempo have increased and our tactics have evolved a great deal in the last 11 years. With added complexity comes new challenges to prepare for deployments. The increased tactical training requirements cannot be the justification to allow the NATOPS fundamentals training to fall by the wayside. The key to reducing skill-based human factors is to reinforce the fundamentals of the NATOPS program. Having a solid NATOPS foundation will enable our aircrew to perform the best when faced with complex, compound emergencies and give them the best chance to turn a potential Class A mishap into a hazrep.

The increased tactical training requirements cannot be the justification to allow the NATOPS fundamentals training to fall by the wayside.

The Human Factors Analysis Classification System (HFACS) collects mishap data in four tiers, low to high, called Acts, Preconditions, Supervisory and Organizational Influences. An HFACS Study of Class A mishaps comparing FY-10 to FY-11 at the ACTS level showed an increase in skilled-based errors (e.g. unintended operation of equipment, checklist not followed and procedure not followed). At the organizational-influences tier, another increase was seen in organization processes. Examples are pace of ops-tempo/workload creates unsafe situation; organizational program/policy risks not adequately addressed, leading to an unsafe situation; and organizational (formal) training is in adequate or unavailable. The study showed that the probability of these increases being due to chance is extremely low.



For one mishap in FY12, it is too soon to determine if HF-related issues are involved. Percentage of aircrew-HF mishaps could increase once we determine the nature of this mishap.

A look at mishap characterization reveals nearly two-thirds are due to aircrew-related human factors in both FY11 and FY12.

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FY11 and FY12 Class A Flight Mishap Totals

- FY11 – 16, FY12 – 15.
- Aircrew human-factor involvement: FY11 – 10 of 16, FY12 – 9 of 15. Equates to 61% of all Class A losses in FY11 & FY12.
- In Field Takeoff, Hover & Landing Environment: FY11 – 5 of 10, FY12 – 7 of 9.
- 63% of the Class A losses due to aircrew human error.

Back to Basics in the Airfield Environment

61% of all Class A mishaps in FY11 and FY12 can be characterized as aircrew human factors mishaps. 63% of those occurred in the landing/ takeoff/hovering environment ashore. We average almost 10 times as many flight hours ashore compared to hours afloat. Mishaps over the past two years indicate only one Class A mishaps involving aircrew human factors while landing afloat. We need to take a hard look at our training for the ashore airfield environment. Do we focus enough on our training in the landing environment away from the boat? Are we forgetting the basics? Risk afloat is greater, yet controls are in place and effective (VFA-211 B-Nut successful recovery aboard ship). Our exposure ashore is much greater due to the percent of flight hours flown in that environment.

61% of all Class A mishaps in FY11 and FY12 can be characterized as aircrew human factors mishaps. 63% of those (39% of all Class A's) occurred in the landing/takeoff/ hovering environment ashore. We need to take a hard look at our training in this environment.

Questions we should ask ourselves:

- Do we have sufficient risk controls in place for ashore ops?
- Are we looking at our proficiency?
- Are we best leveraging use of our simulators?
- Are challenging scenarios practiced often enough to ensure proper procedural compliance?
- Does our focus on NATOPS suffer due to necessary emphasis on tactics and weapons employment? (The basics)
- Are we just letting our guard down in the at-home "safer" environment? (More tense at the boat environment). Greater focus?

Typical HF-related errors: Improper procedures on runway during emergencies (NATOPS violations), improper weight and balance calculations both helo and fixed wing. Improper calculations of actual power available versus power required (helo). Poor aircrew coordination.

Maintenance Mishaps

Maintenance causal factors

- Comprise a small portion of Class A mishaps
- Therefore, look at Class B and C mishaps
- FY11 & FY12 = 98 events

Maintenance Mishaps

FY-11			FY-12		
Rank		Severity	Rank		Severity
1	Failure to follow maintenance instructions	1	✓ 1	Failure to follow maintenance instructions	1
2	Aircraft maintenance turns	2	✓ 2	Aircraft maintenance turns	2
3	Aircraft towing	3	✓ 3	Aircraft towing	3
4			4	Personnel injury (falls)	
5			5	Tool control	

✓ Note the repeat of mishap characterizations in FY-11 and FY -12

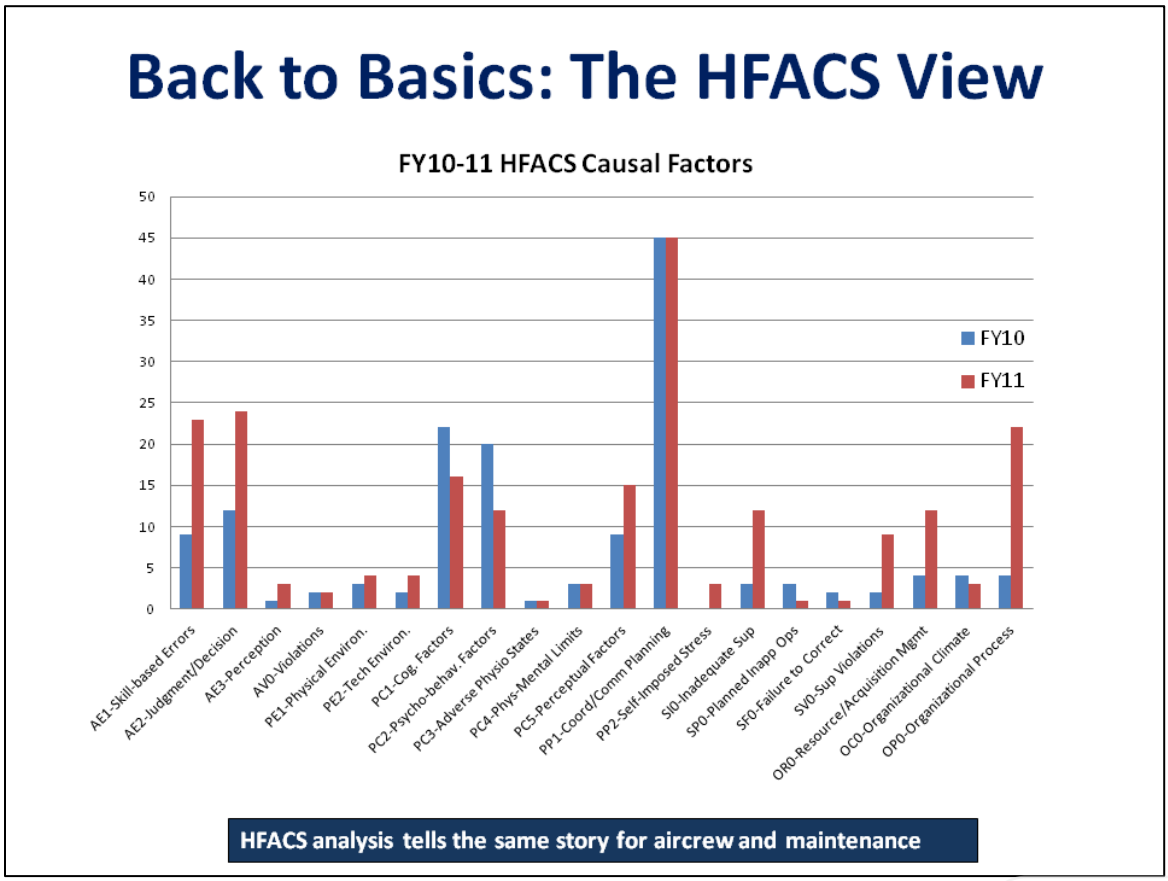
9

Back to Basics -- Maintenance Environment

FY11- 12 — 6 0 mishaps. Common factors:

- Performing maintenance on loaded weapons
- Improper completion of special/conditional inspections
- Lack of QA/CDI/SUP involvement/supervision
- Not heeding NOTES / CAUTIONS / WARNINGS
- Lack of knowledge & experience
- Improper daily/pre-flight inspections
- Poor communication/pass down, complacency

Two basic, recurrent errors: Failure to follow pubs, lack of supervision .



- Skill-based and judgment errors are increasing.
- Supervisory-level operations planning issues are still high.
- Organizational-level process (optempo, guidance, training) is increasing.
- Statistical trends are not possible to determine due to the low number of mishaps.
- CRM remains the most frequently cited causal factor, although incidences decreased.

Skill-based and judgment errors are increasing. Problems with operational planning at the supervisory level remain high.

Aviation Safety Surveys — Areas for Improvement

Aircrew:

- Complying with NATOPS & SOPs
- Basic airmanship
- Balancing tactical qualifications with flying skills

Maintenance

- Complying with maintenance publications
- Basic maintenance practices
- Balancing work accomplishment with quality assurance

Safety Survey Top 10 Discrepancies

Maintenance Safety Surveys – FY11 vs. FY12

FY-11			FY-12		
Rank		Severity	Rank		Severity
1	Aircraft logbook inspection and TDs don't match OOMA/NALCOMIS		1 ✓	Personnel lack ORM knowledge and proper application	
2	Personnel lack ORM knowledge and proper application		2	Improper/Lack of proper use of personal protective equipment	1
3	Outdated publications utilized by maintenance personnel	1	3	Failure to use publication/checklist during task	2
4	Tool inventories not updated to reflect changes		4	Poor communication between work center and maintenance control/unrealistic expectation	3
5	Pre-expendable and spare parts bin lack proper accountability		5	Lack of senior leadership guidance during towing evolution	
6	Hydraulic fluid log not fully documented and class 6 results not entered in logbook		6	Tool Control: Shift change ATAF, lack of knowledge for lost/missing tool reporting	
7	Personnel introducing spark producing items within ALSS hazard area		7	Improper storage of Hazardous material	
8	Missing safety devices on shop equipment, (i.e. sewing machine, grinders, drill press)	3	8 ✓	Missing safety devices on shop equipment, (i.e. sewing machine, grinders, drill press)	
9	Material Safety Data sheets not updated and lack unique identifier		9 ✓	Personnel introducing spark producing items within ALSS hazard area	
10	Pre-operational checks not performed prior to use of equipment	2	10 ✓	Aircraft logbook inspection and TDs don't match OOMA/NALCOMIS	

✓ Repeat discrepancies

Six new items (#2-#7) appeared on the FY12 list because we revised the survey checklist to include identifiable safety risks as well as program-related procedures, and also added more ORM across all work centers. This improvement to our process helps explain why #1 in FY11 moved to

#10 in FY12; also, in FY11 most commands had short-term issues with loading their initial data in a new part of the aviation-maintenance database program.

The "Severity" 1-2-3 rank is based on the subjective analysis of our maintenance experts, identifying the items that pose the greatest risk (as opposed to the frequency of a particular discrepancy).

Safety Surveys – Air Stations

FY-11			FY-12		
Rank		Severity	Rank		Severity
1	Runway/Taxiway markings faded, worn or peeling		✓ 1	Runway/Taxiway markings faded, worn or peeling	
2	Grass obstructing view of airfield signage & lighting		✓ 2	Grass obstructing view of airfield signage & lighting	
3	No vehicle traffic signs or hold short lines to airfield		✓ 3	No vehicle traffic signs or hold short lines to airfield	
4	Surface corrosion on AG		✓ 4	Surface corrosion on AG	
5	Arresting gear lubrication		5	Arresting gear lubrication	
6	FOD underneath AG system		✓ 6	FOD underneath AG system	
7	No explosion proof lighting		7	Expired gauges on fuel equipment and trucks	
8	Fuel sample documentation		8	QA fuel lab not IAW the NATOPS & UFC	
9	Missing fuel farm pump placards		9	Explosion proof lighting (fuel lab)	
10	Point of sale meter not calibrated		10	BASH	

✓ Repeat discrepancies

Culture Workshop Results/Areas of Concern – Aviation

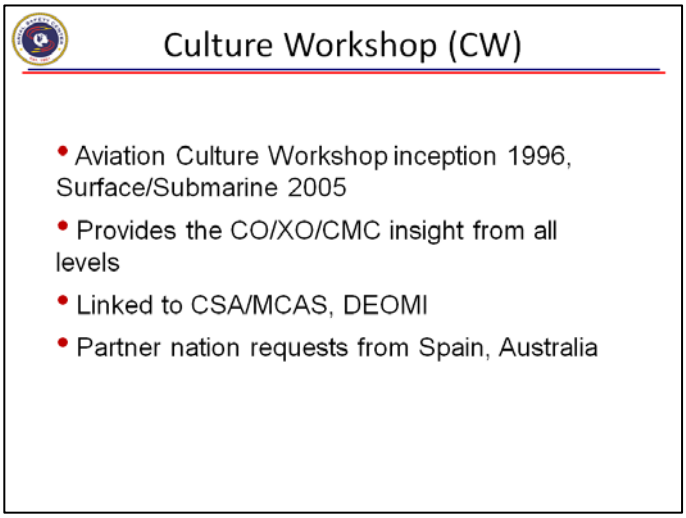
- Mismatch of manning and skill-sets
- Mandatory training not done because of optempo
- Lack of skipper's authority
- Aircrew not current
- High optempo
- Fatigue
- Lack of resources, aging aircraft, aircraft transitioning
- Force-shaping programs create problems
- Enlisted leadership lacks experience
- Millennial generation challenges
- Safety takes lower priority

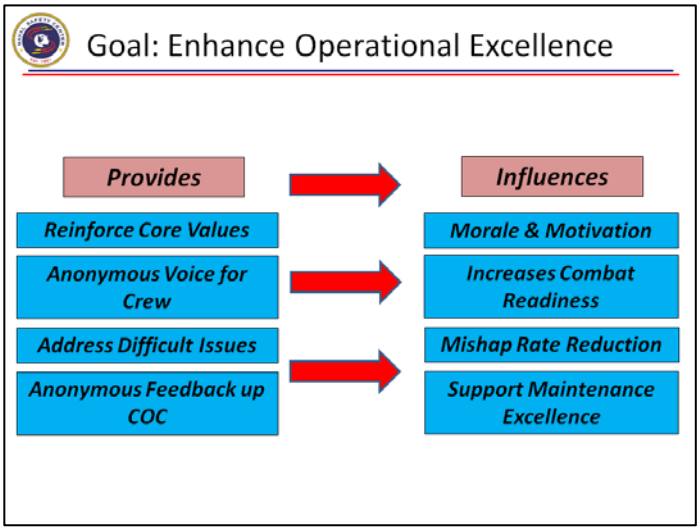
Culture workshops continue to highlight a range of important issues that must be on a skipper's scan.

Culture Workshop Results/Areas of Concern – Surface

- Deckplate Sailors lack competence for some important tasks
- Communication breakdowns between officers and enlisted personnel
- Operational demand from external sources
- Poor command indoc/PQS
- PQS/training ineffective
- AT/FP requirements
- Manning and cannibalization (borrowed) equipment to support INSURV
- Hostile work environment, sexual assaults

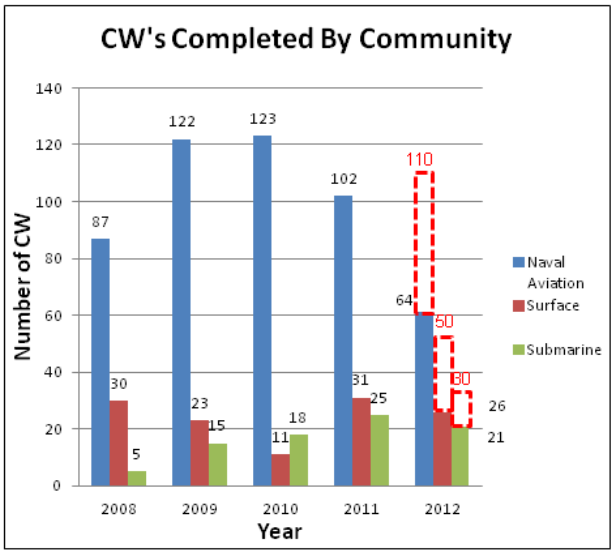
Culture Workshop Program

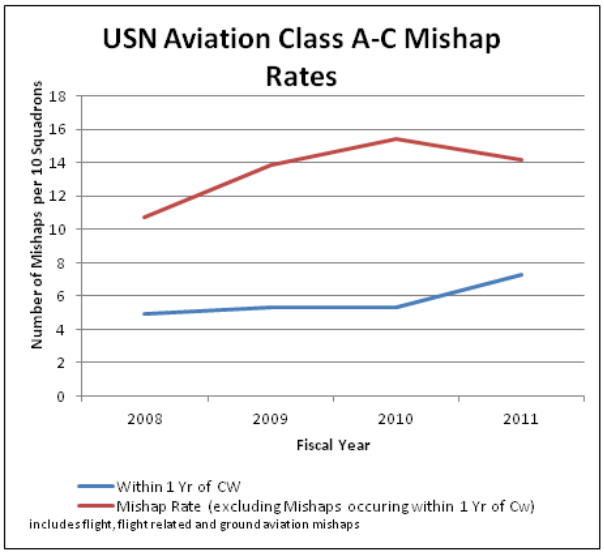




Culture Workshops

- Workshops Complete FY08-12
- USN Aviation Mishap Rates vs Mishaps of CW Squadrons





Feedback Uniformly Positive -- All Ranks, All Communities

The way ahead for the Culture Workshop program includes development of an OPNAVINST; publishing messages with key insights for senior leaders and best practices for all commands; and an overall summary of trends.

Aviation squadrons within a year of a culture workshop have dramatically lower mishap rates.

Solving the Problem of Hornet "Falling Leaf" Mishaps

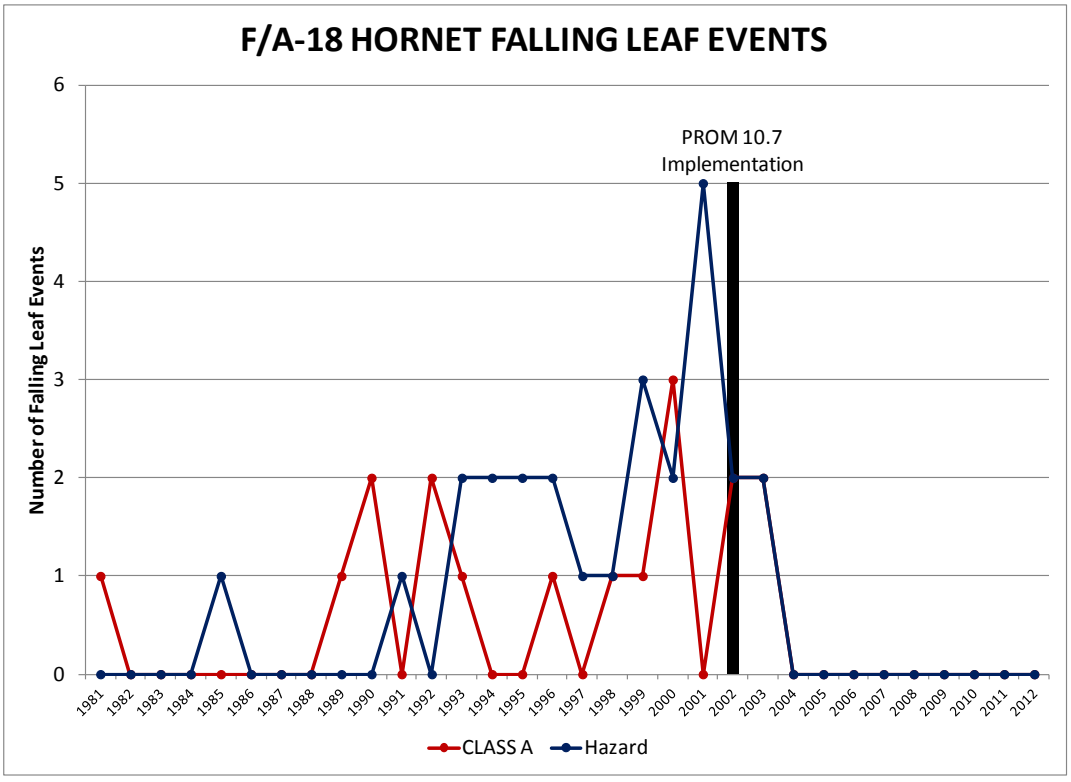
In a "falling leaf," the airplane is in a very flat attitude, waffling back and forth with descent rates up to 20,000 ft/min. It literally is what the name implies: the airplane is falling out of the sky like a leaf from a tree.

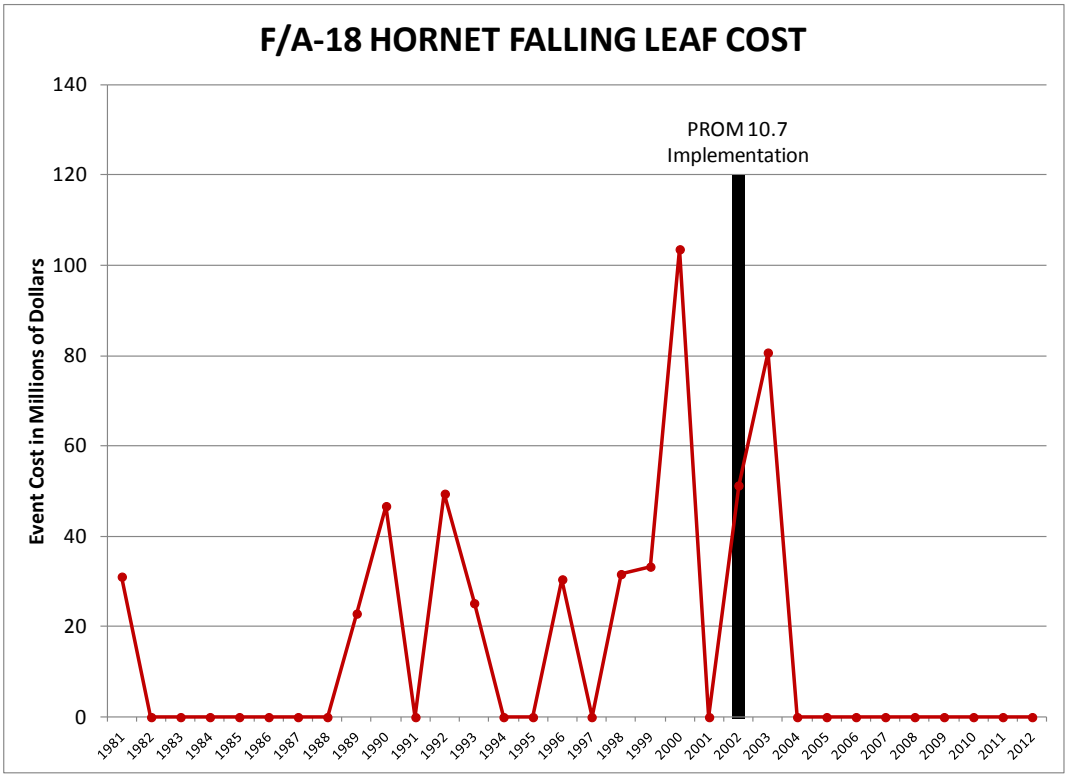
Technically, the terms refers to a departure from controlled flight usually entered by high angle-of-attack (AOA), nose-high attitudes with low airspeed. The "falling leaf" mode is characterized by repeated cycles of large, uncommanded roll–yaw motions that reverse direction every few seconds. At each reversal, the aircrew senses high side-force accompanied by near zero G.

The technological solution to the Hornet "falling leaf" mishap regime virtually eliminate the problem.

The Hornet was plagued by this departure and difficulty in recovering from it until 2002 when a new programming upgrade for the flight control system was introduced. PROM (programmable read-only memory) 10.7 eliminated the "falling leaf" departure regime of the Hornet. From 1981-2002, 15 F/A-18s were lost due to pilots being unable to recover from a "falling leaf" departure. With the introduction of PROM 10.7 in 2002, there has been zero F/A-18s lost.

As you can see in the two charts below, the data show that since system modification, the Hornet "falling leaf" issue has been virtually eliminated.




F/A-18 HORNET FALLING LEAF COST
Event Cost in Millions of Dollars
140
120
100
80
60
40
20
0
PROM 10.7
Implementation
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
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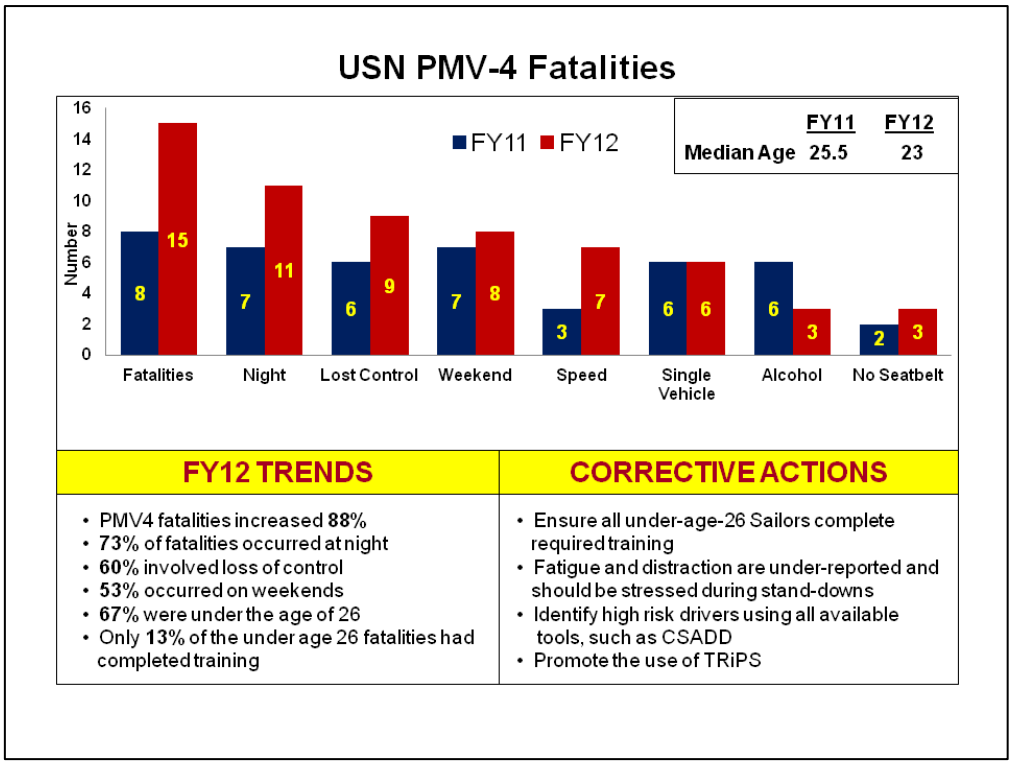
4. Ashore



The only factor that decreased in FY12 compared to FY11 for PMV-4 was alcohol.

Regarding the corrective actions listed on the slide above, here is some amplifying information that we believe will further reduce our PMV4 mishap fatalities.

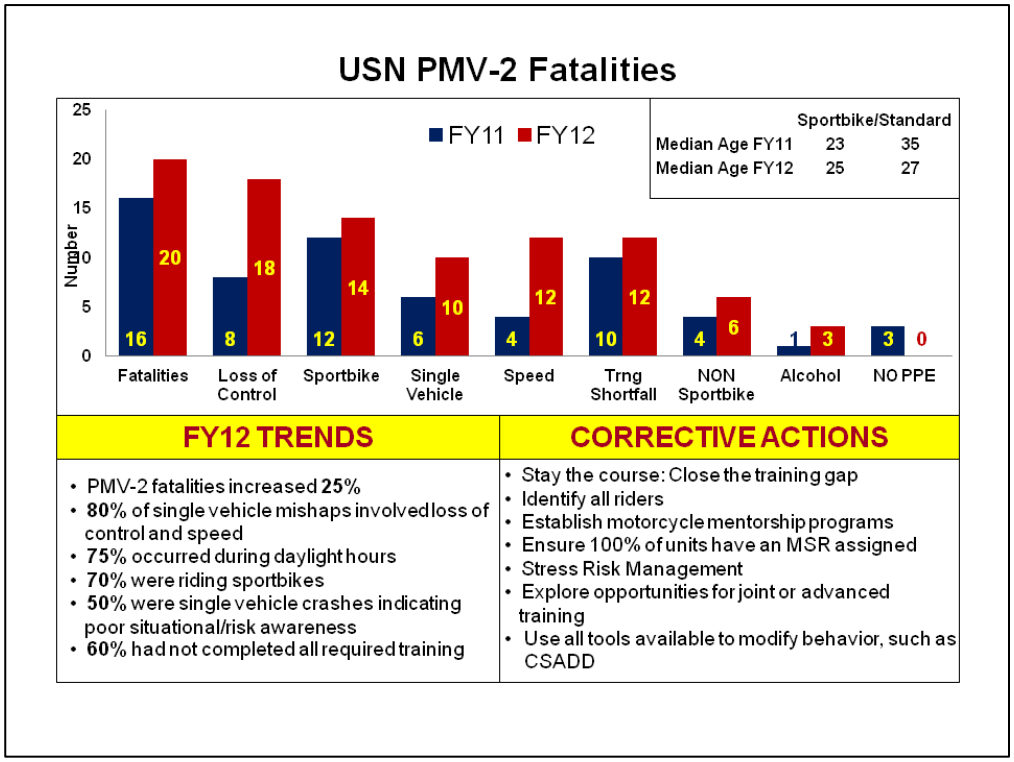
1. Ensure all Sailors under age 26 complete required PMV training. This action item is an issue that has been identified in previous Naval Audit Service audits of our traffic-safety program and during our traffic-safety surveys conducted this year. Ideally, this training should be completed within the first year of service during attendance at any Service or "A" school or at the Sailor's first permanent duty assignment. All commanders, commanding officers and officers-in-charge should direct their Traffic Safety Coordinators to review the training records of each Sailor who is under the age of 26 and ensure they have completed the required training.

2. Fatigue and distraction are grossly under reported in traffic-mishap reports due to the inability of police/investigating officers to definitively determine that fatigue or distraction were causal factors. However, national studies have equated the hazards of fatigued and distracted driving with that of drunk driving. We need to raise awareness of these hazards by using a variety of means including briefs during safety stand-downs which are required prior to all long weekends, major holidays, extended liberty periods, change of station or when mishap trends warrant.

3. Identify high-risk drivers using all available tools, such as CSADD. High-risk drivers may have multiple traffic violations, alcohol or drug abuse problems or other behavioral or personal issues that result in increased stress and can impair judgment. In order to be proactive and provide effective intervention strategies prior to the Sailor being involved in a destructive event (such as a traffic mishap), commanders, commanding officers, leaders and mentors should use all available tools such as the DRB, semiannual performance counseling, mentorship programs, CSADD and engaged leadership to identify high-risk personnel. Once identified, high-risk drivers and motorcycle riders should receive training, counseling or other appropriate assistance.

4. Promote the use of TRiPS. TRiPS is a readily available risk management tool intended to help Sailors identify the hazards associated with their travel plans. It is particularly effective in illuminating the hazards of fatigued driving. While not mandatory, commanders, commanding officers and officers-in-charge should encourage all their Sailors to complete a TRiPS assessment prior to travel on any long weekend, holiday or leave period. The effectiveness of TRiPS is unquestionable: since the inception of TRiPS, more than 343,000 Sailors have completed assessments without a single fatality.

High-risk drivers may have multiple traffic violations, alcohol or drug abuse problems or other behavioral or personal issues that result in increased stress and can impair judgment.



The action items on the slide above were developed from feedback we received form Fleet commanders, riders and safety professionals during our motorcycle safety symposia. To further reduce our PMV2 mishaps, we must do the following.

1. Stay the course: Close the "Training Gap." We have made tremendous strides in ensuring all of our Sailors complete training and are given the skills, knowledge and risk awareness to be successful on our nation's highways. However, we still have individuals who slip under the radar and are killed prior to completing any or all training. To eliminate this challenge, commanders, commanding officers and officers-in-charge must ensure all Sailors who are motorcycle riders complete training.

Sailors who ride but don't identify themselves as riders to their chain of command are very likely to be involved in a mishap.

2. Indentify all riders. Sailors who ride but don't identify themselves as riders to their chain of command are very likely to be involved in a mishap. It is incumbent on all Sailors, leadership and peers, to ensure all Sailors who ride are properly identified, mentored and trained. Failure to act will lead to needless death and injury. Motorcycle Safety Representatives (MSRs) are linchpins to properly identifying and documenting riders and their training status, using ESAMS as the Navy's authoritative data base.

3. Establish motorcycle mentorship programs. OPNAVINST 5100.12J signed in June 2012 requires each command to establish a motorcycle

mentorship program. Commands that are too small or do not have enough riders to establish an effective program can team with other units to do so or may request a waiver from the first flag officer in their chain of command. Mentorship programs are an effective way to ensure all riders in a command are identified, healthy attitudes concerning riding are fostered and continuous training is conducted.

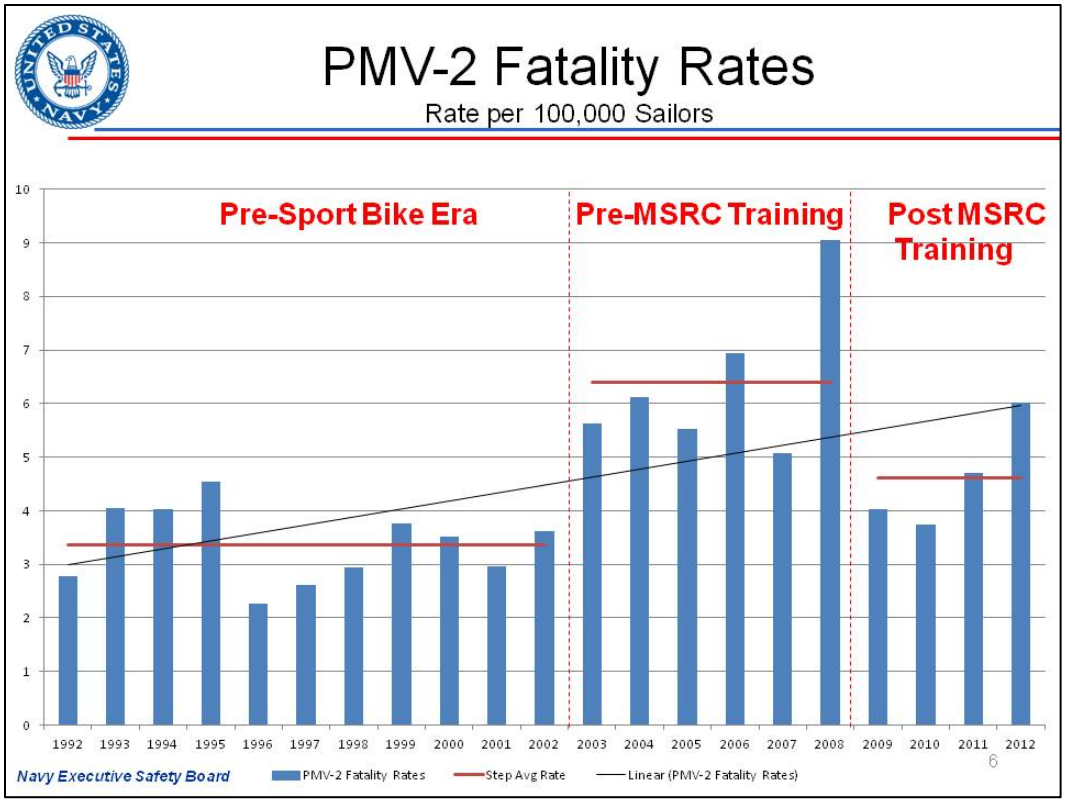
4. Ensure 100% of units have a MSR assigned. All commands are required to designate an MSR, who is charged with assisting the commander in executing an effective motorcycle safety program. Compliance was problematic prior to July 2012, but since this issue was brought to the attention of the Navy's leadership, it has been eliminated. To be effective, commanders must ensure MSRs are given the support, training and recognition to be effective.

Mentorship programs are a key to identifying all riders in a command, fostering healthy attitudes about riding and conducting continuous training.

5. Emphasize risk management. Motorcycle riding exposes riders to risks that other vehicle operators are not exposed to. The lack of seatbelts, airbags, stability augmentation systems, antilock brakes and a steel frame and body around them compounds the hazards associated with such things as roadway hazards and other drivers not paying attention. Rider hazard awareness must remain high at all times. To keep awareness high, commanders should employ all tools available, such as effective mentorship programs, rider training provided by base commanders and other learning opportunities.

6. Explore opportunities for joint or advanced training. The training provided by CNIC at all major Fleet concentration areas has proven to be extremely effective in reducing the number of Sailors killed or injured in motorcycle mishaps. However, we have experienced some difficulty in ensuring that Sailors stationed at remote locations are able to readily obtain training. CNIC and regional commanders have made and continue to make great progress in working with the other military services who have bases in their regions to allow Sailors to obtain training provided by the other service. The Navy is reciprocating. Since the hazards associated with riding are the same regardless of what uniform the individual is wearing, these opportunities for joint training must be pursued aggressively.

7. Use all tools available to modify behavior. High-risk riders are most likely known by their peers or other Sailors in the command. Once identified, high-risk motorcycle riders should receive training, counseling or other appropriate assistance.

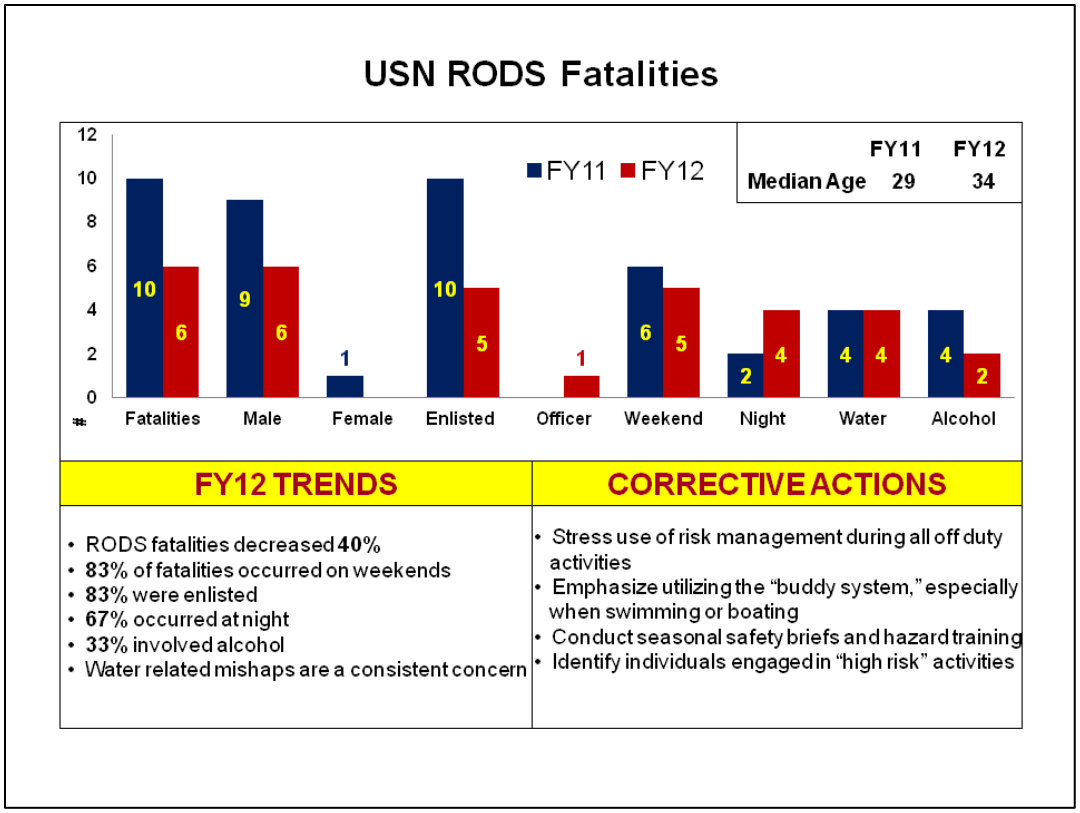


The overall trend for the last 20 years for the PMV-2 fatality rate is increasing. The post-2008 fatality average, although lower than from 2003 to 2008, did not return to previous average. There is an overall increasing trend for the rate from 2009 to the present.

This chart would seem to indicate a fatality problem that is out of control with increasing rate trends from both short- and long-term perspectives. Note that a steady or decreasing fatality rate among motorcycle riders could be masked by increasing ridership. Although motorcycle ridership wasn't carefully tracked until recently, estimated ridership (shown below) doesn't seem to support the increased-ridership theory.

Year	*Population*	*Ridership*	*Percent*
2008	364,265	23,462	6.44%
2009	348,083	23,640	6.79%
2010	347,165	23,436	6.75%
2011	339,925	22,825	6.71%

There are overall increasing trends for motorcycle fatality rates, both short-term (from 2009 to the present) and long-term. This suggests a fatality problem that is out of control.



RODS fatalities decreased 40% between FY11 and FY12.

While the number of Sailors killed when participating in recreational activities is small, we should seek to reduce or eliminate the loss of life from these types of mishaps through implementation of the following actions:

1. Stress the use of risk management during all off duty activities. Most of our recreational fatalities occur on the weekends and involve aquatic activities. Participating in boating, scuba, snorkeling and other water-related activities exposes our Sailors to increased risks especially if they are poor swimmers, untrained or have consumed alcohol. To keep awareness high, commanders should constantly remind all Sailors to get trained, keep situational awareness and avoid alcohol while participating in any recreational activity.

Distracted drivers are not just a hazard to other drivers, they endanger pedestrians, too. High-risk times: at night and on weekends.

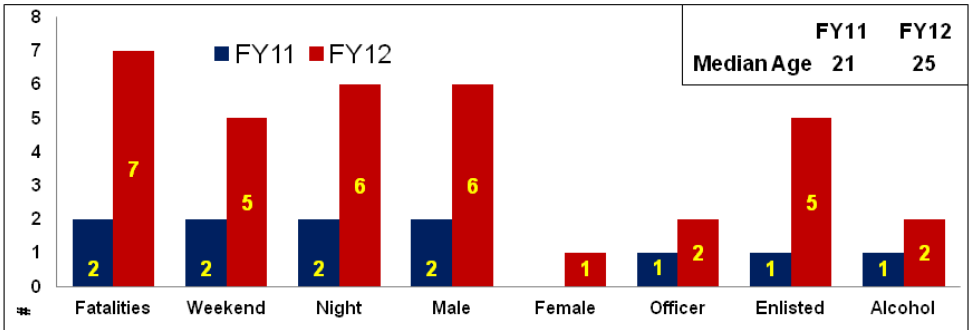
2. Emphasize using the buddy system especially when swimming or boating. The hazards that one faces while engaged in aquatic activities may often go unnoticed by a single person. Should a Sailor get into trouble while swimming, the buddy can render immediate assistance or get professional help. Commanders should constantly seek to enhance the hazard awareness of all their Sailors and encourage use of the "buddy system" especially when boating or swimming.

3. Conduct seasonal safety briefs and hazard training. Since in most locations the recreational activities Sailors participate in changes with

the seasons, the hazards those Sailors will face also change. Because of our diverse demographic, many Sailors may be unfamiliar with or novices at the recreational activity that they or their friends are participating in. To eliminate this hazard, commanders should increase hazard awareness through the implementation of seasonal safety briefs, local hazard training, and effective counseling and mentoring programs.

4. Identify individuals engaged in high-risk activities, such as skydiving, BASE jumping, and bungee jumping. The additional risk that these activities pose to our Sailors can be reduced through proper training, personal protective equipment use and if needed certification. Commanders, leaders and mentors should identify all of their Sailors who participate in high-risk recreational activities and ensure they are properly credentialed, trained and equipped. Encouraging participation in local clubs associated with a particular activity may also prove beneficial.

USN Pedestrian Fatalities



FY12 TRENDS	CORRECTIVE ACTIONS
• **250%** increase in pedestrian fatalities • **71%** of fatalities occurred on weekends • **86%** occurred at night • **71%** occurred between 2400 and 0600 • **57%** indicate pedestrian lack of situational awareness • Alcohol involvement doubled	• Stress risk management, especially on weekends and during hours of darkness • Emphasize hazards associated with walking near traffic • Use "buddy system" to improve SA for both drivers and pedestrians • Increase awareness of dangers associated with distracted drivers

86% of the pedestrian fatalities were at night.

Pedestrian mishap-reduction efforts should include the following:

1. Stress risk management, especially on weekends and during hours of darkness. Most of our fatalities occur on the weekends and at night. They may or may not involve alcohol, but almost all involve a lack of situational awareness either on the Sailors part on the part of a civilian vehicle operator. Unit commanders must raise the awareness of all Sailors to the hazards associated with being out late at night during the

weekend, during periods of reduced visibility and when others may be under the influence of alcohol.

2. Emphasize hazards associated with walking near traffic. Being near traffic at night or during periods of reduced visibility greatly increases the risk of injury or death. We must use briefings, training courses and counseling to ensure Sailors are aware of the hazards they face late at night, when near or on highways.

3. Use the buddy system to improve situational awareness for drivers and pedestrians. While we must constantly seek to enhance the hazard awareness of all our Sailors, one very effective way to increase their potential to avoid injury or death during off duty activities is to use the buddy system. Two sets of eyes are always better than one. Commanders should ensure all personnel comply with all SOFA/SOPA instructions and policy.

4. Increase awareness of dangers associated with distracted drivers. Distracted drivers are a hazard to other drivers and to pedestrians. The likelihood of encountering a distracted or fatigued driver increases at night and on the weekends. Commanders, safety officers and leaders should include discussion of this hazard during safety stand-down briefs to all long weekends, major holidays and extended liberty periods.

With respect to all of the topics discussed above, the Naval Safety Center will continue to promote awareness in all of our print and digital media products, including seasonal campaigns, magazines, presentations, reports, messages, and videos. Use your own media outlets and products to localize and amplify the messages.

Distracted drivers are not just a hazard to other drivers, they endanger pedestrians, too. High-risk times: at night and on weekends.

Navy PMV-2 & PMV-4 By Region

	PMV-2		
	FY11	FY12	5 Yr FY07-11
CNREU	1		3
CNRGU		1	
CNRHI			1
CNRJA			1
CNRMA	3	9	24
CNRNDW		2	
CNRMW			1
CNRNW	2	2	4
CNRSE	1	2	17
CNRSW	8	3	30
CNRSWA	1		1
Indonesia		1	
Total	16	20	82

	PMV-4		
	FY11	FY12	5-Year FY07-11
CNREU			4
CNRGU			1
CNRMA	2	6	31
CNRMW	1	2	5
CNRNW		1	3
CNRSE	2	5	20
CNRSW	3	1	25
Total	8	15	89

Note: Data doesn't include mishaps involving pedestrians or bicycles

USMC PMV-2 & PMV-4 By Controlling Command

	PMV-2		
	FY 11	FY 12	5 Yr FY 07-11
MARBKS WASH DC			1
MARCENT			1
MARCORLOGCOM			1
MARFORCOM	3	3	19
MARFORPAC	10	6	41
MARFORRES		2	8
MARSOC	1		4
MCCDC/TECOM	1	1	4
MCRC			1
SOCOM	1		1
USMC - UNKNOWN			2
Total	16	12	83

	PMV-4		
	FY 11	FY 12	5 Yr FY 07-11
MARFORCOM	10	3	47
MARFORPAC	10	7	55
MARFORRES		1	6
MARSOC		1	1
MCCDC/TECOM	3	1	22
MCRC			2
Wounded Warrior Regiment			1
Total	23	13	134

Note: Data doesn't include mishaps involving pedestrians or bicycles

Traffic and RODS Program Safety Surveys

With Navy off-duty, private-motor-vehicle (both 2-and 4-wheel) mishaps trending upward in FY12, the Naval Safety Center implemented a pilot initiative to evaluate the benefits of adding a traffic-safety specialist to the aviation safety-survey teams. Traffic safety division personnel participated in six survey trips, evaluating the traffic and recreational off-duty programs of more than 50 individual commands since May 2012. Below are the top five most common program issues identified during these visits.

FY-12	
Rank	**Program Discrepancy Areas**
1	Traffic Safety Coordinator and Motorcycle Safety Representative Assignments
2	Traffic-safety training documentation
3	Motorcycle Safety Representative (MSR) use of Enterprise Safety Applications Management System (ESAMS)
4	Traffic-safety for personnel under the age of 26
5	Recreational-Off Duty Safety Programs

1. Traffic Safety Coordinator and Motorcycle Safety Representative Assignments. There is a high turnover rate of Sailors assigned to safety positions. The length of assignment averages 6 to 12 months, with most assigned as a collateral duty. While the positions are advertised as career-enhancing, many times safety billets have the same stigma attached to them as mess-hall duty. We often find that safety petty officers are new to their position and not aware of the depth and breadth of their responsibilities. In order to be most effective, high-quality personnel should be assigned to fill these critical safety-related billets and allowed to remain in the billets long enough to become beneficial to the command, as well as having the support of the entire chain of command.

Often, safety petty officers are new to their position and aren't aware of the depth and breadth of their responsibilities.

2. Traffic-safety training documentation. A variety of databases are being used to track and document completion of traffic-safety training, including locally developed databases, Fleet Temps, NKO, and ESAMS. While the flexibility to use various systems may provide some unique benefits to individual users or commands, the lack of standardization results in inconsistent data, the inability to roll up data from a single

source, and challenges with user proficiency and training. Since the use of ESAMS is mandatory for management of all motorcycle safety training programs and the system is capable of also documenting general traffic-safety training requirements, commands should consider using ESAMS to manage all their traffic-safety training program requirements.

3. Motorcycle Safety Representative (MSR) use of Enterprise Safety Applications Management System (ESAMS). Not all MSRs are using ESAMS to track motorcycle riders and mange their commands' motorcycle safety programs. On 26 June, OPNAVINST 5100.12J, Navy Traffic Safety Program, was released, making it mandatory for every command to designate a MSR. MSRs are required to use ESAMS to manage their command's motorcycle safety program. ESAMS allows the MSR to schedule and monitor training, collect and maintain all required rider information such as driver license number, insurance policy, bike registration data and more. The new instruction clarifies policies, eliminates the need to maintain numerous NAVADMINs as references, publishes new responsibilities for commanding officers and MSRs.

Some MSRs aren't using ESAMS to track motorcycle riders and mange their commands' motorcycle safety program.

4. *Traffic safety training for personnel under the age of 26.* Not all commands are ensuring compliance with and properly documenting the completion of required "entry level" traffic-safety training. During the last five years, 66 percent of the Sailors killed in automobile mishaps were under the age of 26. This should be no surprise, since the same trend is why insurance rates are higher for young drivers and why OPNAVINST 5100.12J directs that all military personnel under the age of 26 receive 4 hours of traffic safety training within 12 months of entering the Naval Service. This training may be done, if time permits, as part of the Delayed Entry Program or it should be completed by the Sailor's first command following graduation from recruit training. This training is not being completed in many cases, placing an undue burden on fleet commands preparing for deployment. The Naval Audit Service has identified this discrepancy in past audits of the Navy's traffic safety program, where it was found that, in some units, more than 60 percent of the Sailors under the age of 26 had not completed the training.

5. Recreational-Off Duty Safety Programs. Many commands do not have a recreational off-duty program established. OPNAVINST 5100.25B, Navy Recreation and Off-Duty Safety Program, requires commanders to designate a Recreation and Off-Duty Safety (RODS) coordinator and to implement a RODS program. This program should include identifying all personnel engaged in high-risk recreational activities, ensuring those personnel are aware of the risks associated with their chosen activity, conducting seasonal safety programs and briefs, coordinating their RODS program with the local base or station and ensuring ORM is incorporated in all unit recreational activities.

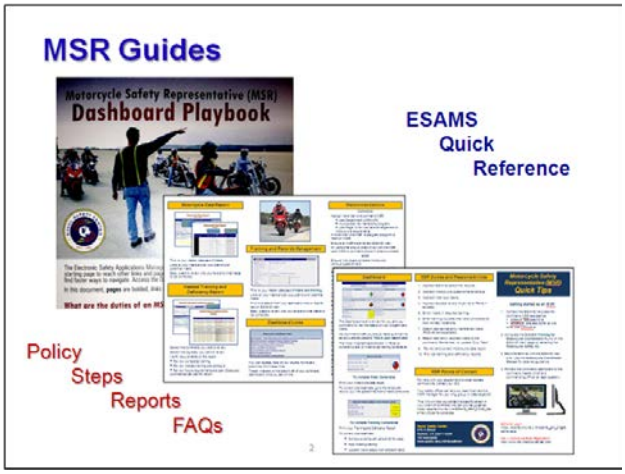
Motorcycle Symposiums Summary and Results

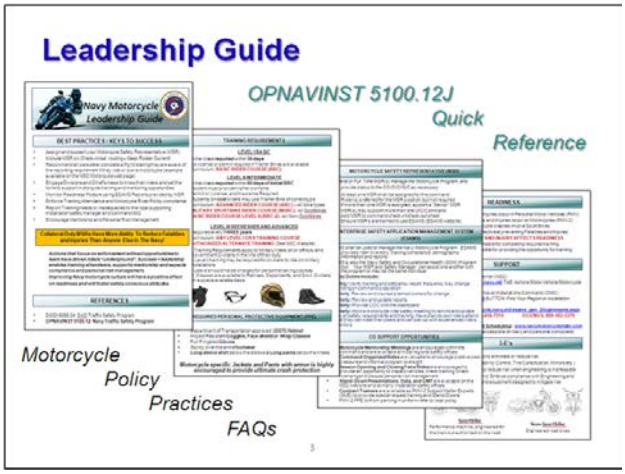
Symposium Summary

- Visited 17 strategic USN and USMC installations.
- More than 2,700 attendees.
- Goal was to receive deck plate feedback from current MSRs.
- Input from motorcycle riders, safety managers and military leadership was encouraged.
- 46 outstanding MSRs and 49 speakers who discussed their crashes were recognized.
- Introduced "Mishap" PSA campaign.
- "Navy Leadership Guide," "MSR Dashboard Playbook" and "MSR Quick Tips" brochures were distributed and were well received.
- Discussed motorcycle and other safety issues specific to upper leadership in a separate meeting with Master Chiefs and above to emphasis the need for leadership support and commitment to safety goals.

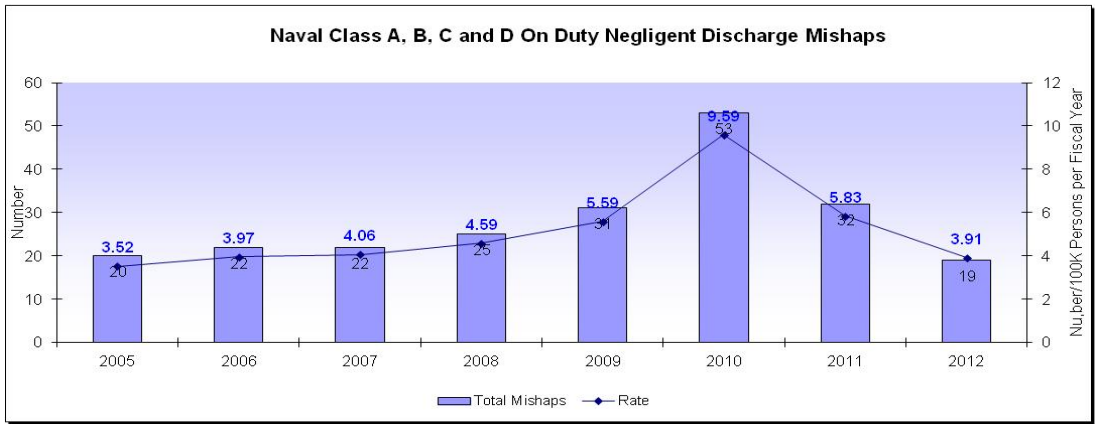
Symposium Results

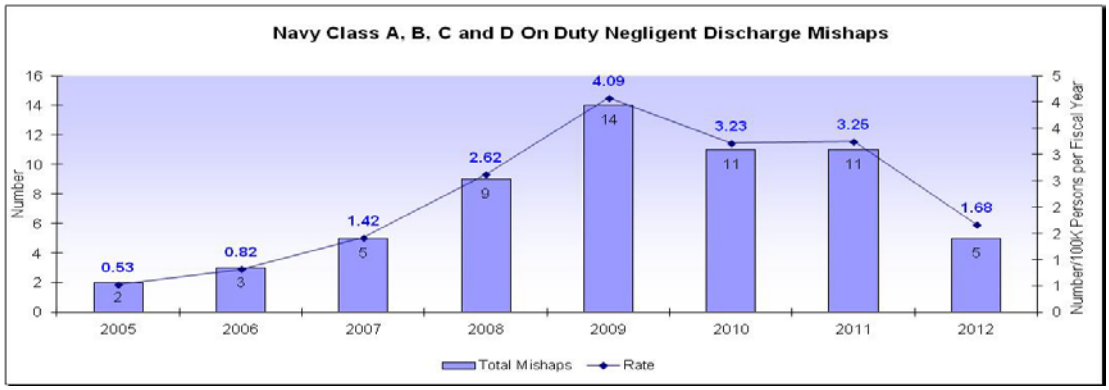
- Many MSRs are engaged and doing an excellent job.
- Concerned that approximately 1/3 of the commands do not have MSRs assigned. Norfolk has 147 commands; only 103 had MSRs. Percentage is consistent across USN.
- Discussions indicated that some facilities need to be reviewed for adequacy.
- The MSR guides were provided to the fleet to offer quick and easy references for untrained MSRs. They provided step-by-step guidance on key elements of ESAMS.
- MSR guides provided MSR duties and responsibilities that were not clear policy until the update of the OPNAVINST 5100.12J.

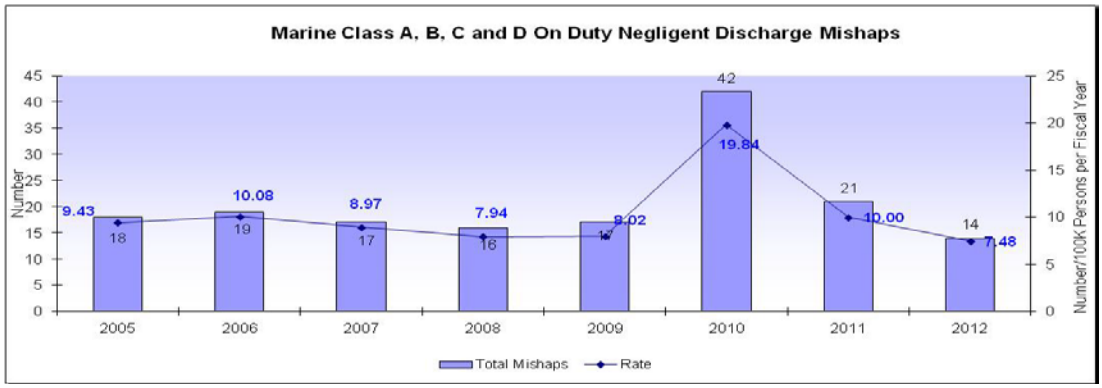




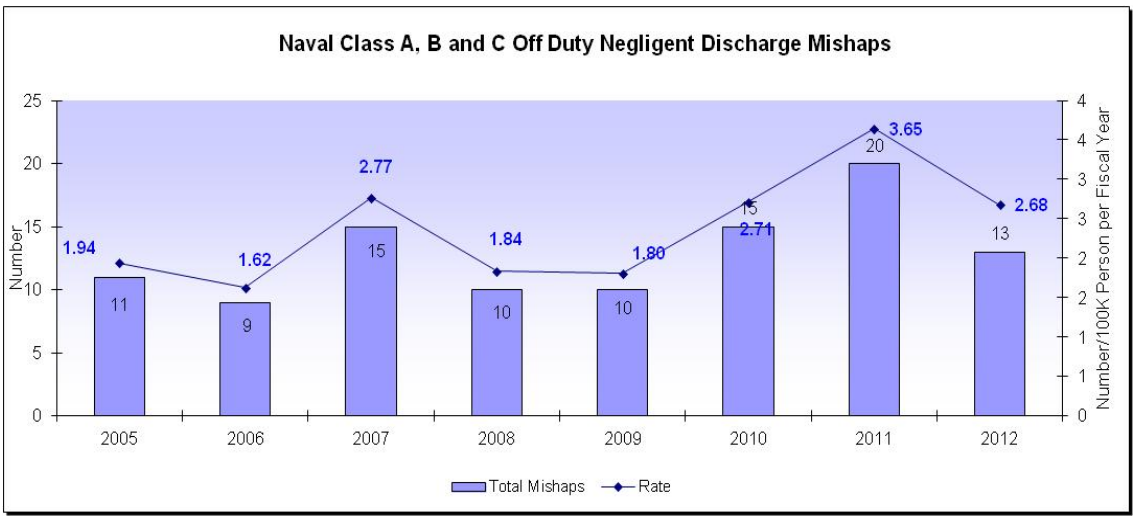
5. Firearms Negligent Discharges, On-Duty and Off-Duty

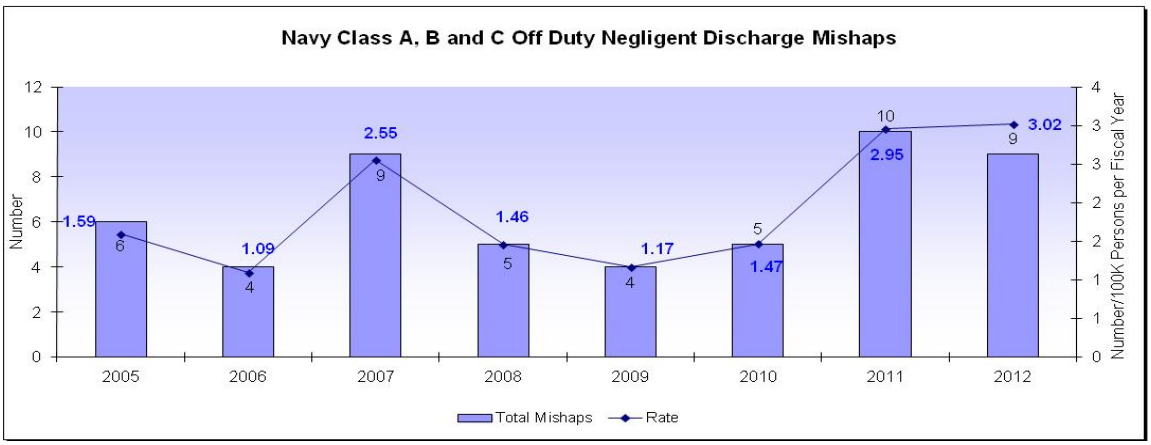


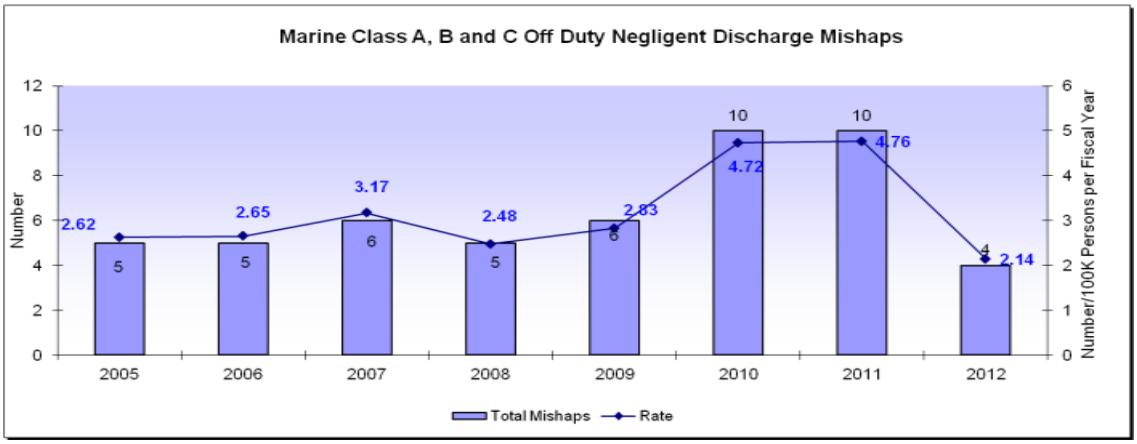




The current FY12 on-duty rate is statistically significantly lower than the previous five-year rates for both services. Marines have a higher probability of having an on-duty negligent discharge because they handle weapons more often than members of the Navy.







Causes of FY12 off-duty firearms mishaps:

- Inexperience with handling personal firearms (lack of training).
- Improper weapons handling (errors while trying to clear weapons).
- Handling firearms during/after consuming alcohol.

6. Premeditated Parachuting Program Survey Results

The Naval Safety Center parachuting SMEs conduct paraloft safety surveys and inspections as a means to provide required oversight of Navy and Marine Corps paralofts and to support mishap prevention efforts. Common discrepancies are identified and best practices shared with each paraloft to improve management of jumpers and equipment. These trends, along with lessons learned stemming from Navy and USMC parachuting mishaps, are formally shared three times a year with the Navy, Marine Corps and DoD parachuting communities of interest during the Airdrop Malfunction and Safety Analysis Review Boards.

Safety Surveys – Navy Paraloft

FY11		FY12	
Rank	**Discrepancy**	**Rank**	**Discrepancy**
1	Designating personnel with incomplete qualification requirements	1 ✓	Missing individual letters of designation in training records for personal qualifications
2	Missing individual letters of designation in training records for personal qualifications	2	Missing High Altitude Physiology School (HAPS) qualification documentation in individual training records for Military Free-Fall qualified parachutists
3	Inaccurate/missing service- or shelf-life data on components and maintenance documents	3	Incorrect part number for parachute components documented on equipment history records
4	Missing individual Job Qualification Requirements (JQR) for personal qualifications	4 ✓	Designating personnel with incomplete qualification requirements
5	Incorrect military and non-standard parachute packing procedures	5 ✓	Inaccurate/missing service- or shelf-life data on components and maintenance documents

✓ = Repeat discrepancies

Ranking of Navy paraloft survey discrepancies is based on the number of occurrences (less subjective) of the discrepancy during the 10 surveys conducted in FY11 and the eight surveys conducted in FY12. As annotated above, three specific discrepancies repeated in the FY12 Top Five List as compared to the previous fiscal year, indicating areas that need additional focus and attention-to-detail across the P3 community.

Safety Surveys – Marine Corps Paraloft

FY11		FY12	
Rank	**Discrepancy**	**Rank**	**Discrepancy**
1	Missing Standard Operating Procedures (SOPs)	1 ✓	Missing Standard Operating Procedures (SOPs)
2	Lack of or mismanaged Tool Control Program	2	Missing appointment letters in Individual Training Records (ITR) for personal qualifications
3	Inadequate 0451 Parachute Riggers on the units Table of Organization to properly support mission requirements	3	Missing or incomplete desktop or turnover procedures
4	Missing Modification Work Order (MWO) Message Control Log	4	Designating personnel with incomplete qualifications
5	Inadequate parachute maintenance facility lighting	5	Inaccurate and missing service or shelf-life data on equipment components and maintenance documents

✓ = Repeat discrepancies

Ranking of Marine Corps paraloft survey discrepancies is based on severity due to the relatively low number of surveys conducted in FY11 (four) and especially FY12 (one).

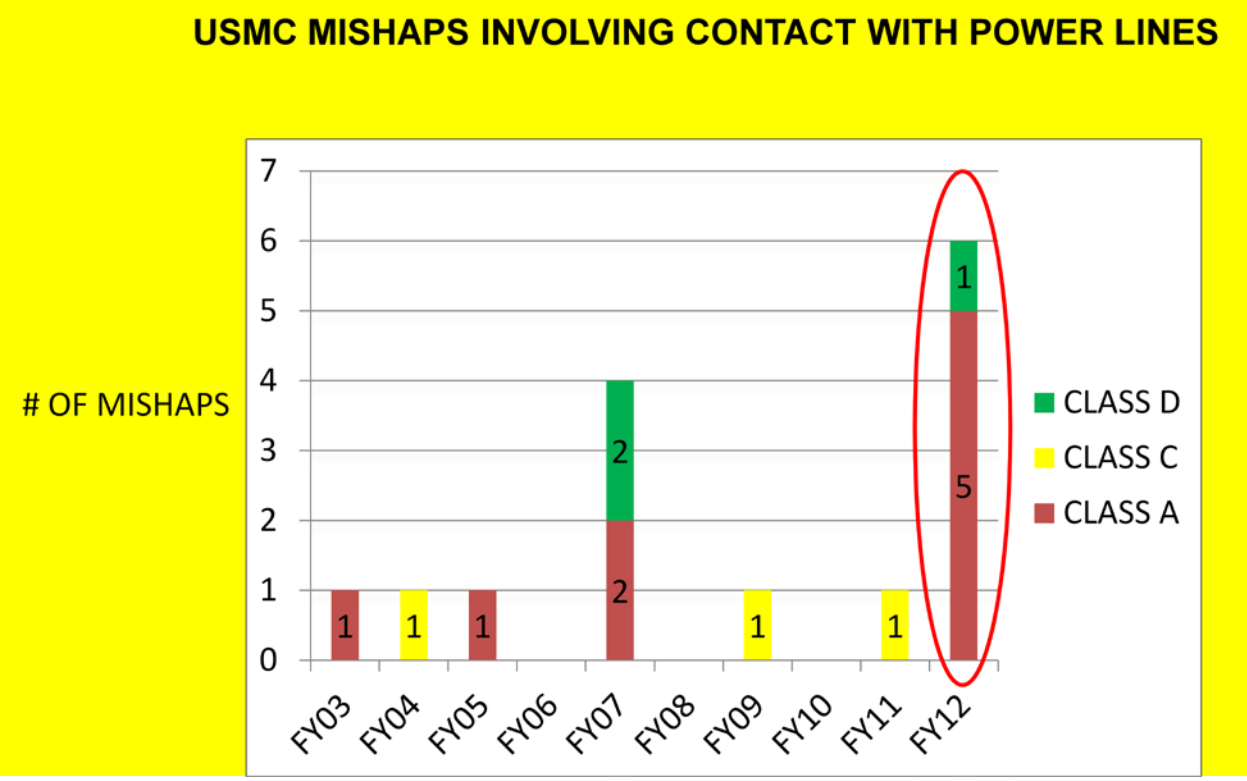
7. High-Risk Training Survey Results

FY11		FY12	
Rank	**Discrepancy**	**Rank**	**Discrepancy**
1	No documentation to validate completion of maintenance equipment used in support of high-risk training	1	Not following or using outdated OPNAVINSTs. Not following local/command INSTs/SOPs
2	High-risk program not fully implemented	2 ✓	Instructor screening not IAW OPNAVINST 1500.75B
3	Instructor screening not IAW OPNAVINST 1500.75B	3	Training Safety Officer (TSO) letters of designation not signed or not signed by current CO
4	CPR/AED/First Aid/ Blood-borne Pathogen documentation not maintained in training records	4	Emergency Action Plans not IAW OPNAVINST 1500.75B
5	Inconsistent qualification process, e.g. Job Qualification Requirements (JQR), Core Unique Instructor Training (QUIT) or Personnel Qualification Standard (PQS)	5	Instructors allowed to teach before being trained and certified in CPR/AED/First Aid/Blood-born pathogen (Prerequisite)

✓ = Repeat discrepancies

Most High-Risk Training (HRT) surveys are in support of Echelon 2/3 Training Agencies and their compliance representatives. The surveys both evaluate their program-oversight process and provide assistance to them. However, some HRT assist visits are conducted solely by NSC HRT staff at the request of specific commands and activities. Some of the above discrepancies were the observance of our team and documentation was provided to the compliance representative for inclusion in their final report to the command. Other discrepancies were identified during our unaccompanied surveys to requesting units with an all-inclusive final report provided by our team lead.

8. USMC Combat-Zone Electrocutions



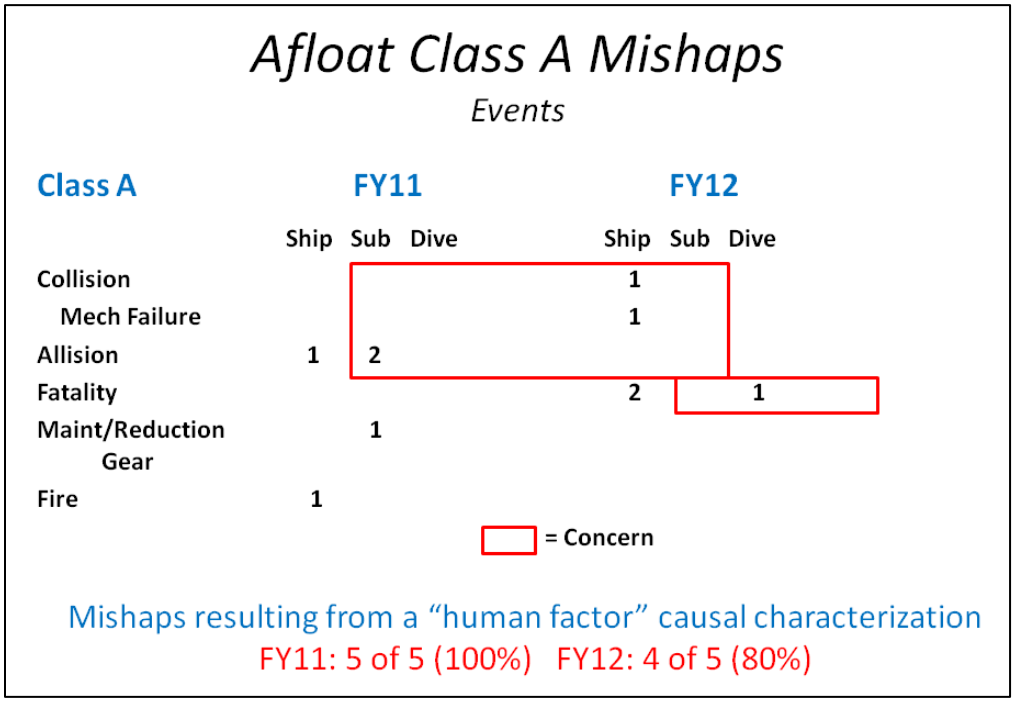
During FY12, a total of five Class A mishaps (six fatalities) occurred in Afghanistan involving contact with low-hanging power lines. In response to this developing trend, Naval Safety Center, in coordination with HQMC SD, provided mishap data analysis to the Defense Safety Oversight Council (DSOC) Electrical Safety Working Group. This data is being used to address a Universal Urgent Needs Statement (UUNS) from I MEF (FWD) which highlights the hazards of Marine Corps radio operators contacting low-hanging power lines in the combat zone.

Ongoing collaborative efforts with HQMC SD, MARCORSYSCOM, MCCDC, and the Army Research Lab include defining near-term, mid-term and long-term material solutions and changes to techniques, tactics and procedures (TTPs) to mitigate this hazard.

Also, we coordinated with the Marine Corps Center for Lessons Learned to include information about this critical hazard on their website.

During FY12, six active-duty personnel died in Afghanistan when they were electrocuted by low-hanging power lines.

9. Afloat



FY12 Mishaps

- 12 Aug 2012, DDG entering Arabian Gulf collided with outbound tanker in strait. Unsafe Act/Violation/Deliberate with unintended outcome – Failure to follow COLREGS.
- 14 Jul 2012 (Hong Kong, PRC) E-2 fell from ship's flight deck onto adjacent barge. Unsafe Act/Error/Unintended negative consequence/Slip in attention or distraction error.
- 16 May 2012 (SOCAL OPAREA) LHD collided with T-AO during underway replenishment. Mechanical Component Failure.
- 23 Nov 2011 (Indonesia) E-6 was fatally injured during preparations for getting underway. Unsafe Act/Violation/Deliberate with unintended consequences – Exceptional rule-bending violation.
- 26 Jan 2012 (near Cape Lookout, NC) E-5 died while undergoing hyperbaric treatment for a dive injury. Unsafe Condition/Adverse Mental State/Illness – Mishap victim vomited in MK-16 MOD-1 UBA.

Nine of the 10 afloat Class A mishaps during FY11 and FY12 involved human factors.

Afloat Class A Mishaps

Causal Factors

Class A	FY11			FY12		
	Ship	Sub	Dive	Ship	Sub	Dive
Human Factors:						
Unsafe Supervision						
Inadequate 10%	1 Allision					
Unsafe Act 50%						
Error		1 Allision		1 Fatality		
Violation	1 Fire			2 Collision, Fatality		
Failed to Follow 20%						
Requirements		2 Reduction Gear, Allision				
Unsafe Condition 10%						
Adverse Mental State						1 Fatality
Reliability of Equipment:						
Mechanical Failure 10%				1 Collision		

Afloat Survey Results

Afloat Safety Survey Top Ten Discrepancies

FY11			FY12		
Rank		Severity	Rank		Severity
1	Subs: Safety and work lanyards onboard are not authorized for submarine use.	1	1	Subs: Flood control doors do not lock when their latches are released.	3
2	Subs: Electrical equipment (both government and personally owned) aren't properly safety checked or tracked (e.g., EGL)	1	2	Subs: MRC 5832/014 Q-1 is not being performed on all MK 1 commercial life jackets.	1
3	Ships: Portable electrical safety checks not performed, shorting probes not IAW PMS, equipment not grounded	1	3 ✓	Ships: Flam lockers were not NAVSEA-approved, not self-closing and lockable, amount in locker exceeded 7-day and/or 30-gallon limit,.	2
4	Ships: Correct stowage racks not provided, H2S detector system log book not available, CHT gear locker not installed near CHT Pump Rooms entrance.	1	4 ✓	Dive: PMS not implemented properly.	2
5	Dive: PMS not implemented properly.	2	5 ✓	Ships: Portable electrical safety checks not performed, shorting probes not IAW PMS, equipment not grounded	1
6	Ships: Flam lockers were not NAVSEA-approved, not self-closing and lockable, amount in locker exceeded 7-day and/or 30-gallon limit, air flow alarms inop .	2	6 ✓	Ships: Correct stowage racks were not provided, H2S detector system log book not available, CHT gear locker not installed near CHT Pump Rooms entrance, air flow alarms inop.	1
7	Subs: Pneumatic grease guns are not configured IAW submarine greasing manual.	2	7	Ships: Zone inspection deficiencies were not documented in CSMP or tracked to completion. Commands do not have an active zone inspection program.	2
8	Dive: Hazmat storage and labeling	2	8 ✓	Subs: Pneumatic grease guns are not configured IAW submarine greasing manual.	2
9	Ships: Warning placards missing.	3	9	Dive: Chamber logs not available	
10	Dive: Chamber logs not available		10 ✓	Dive: Filter housings not inspected.	

✓ Repeat discrepancies

FY12 Trend Data vs. FY02 Snap Shot Data

(Surface and submarine, cited from *Ships' Safety Bulletin* June 2002 and *FLASH* Jan 2002)

- Minor changes compared to today's data. Items cited as issues then are issues now (fall protection, electrical safety, portable-electrical equipment, posted warning signs, explosion-proof lighting, life preservers, safety officer admin, pneumatic grease guns).
- Lack of PMS compliance.
- Pneumatic grease guns not configured per the Submarine Greasing Manual (*FLASH* Jan 2002).
- Cross divisional/departmental lines cited as "root cause" for lack of PMS compliance.

The past decade has seen a reduction in supervisory-level maintenance expertise and compliance oversight. Sailors don't understand PMS checks and lack technical knowledge.

FY12 vs. FY02 Trend Analysis Data

(Divers, cited from *Diving Safety Line* articles and Code 30 database)

- Similar dive discrepancies throughout trend period. PMS program is not being implemented for all diving- and diving-related equipment. Filter housing (air system/compressors) have not been tested and tagged.
- Periodicity for diving safety surveys has remained the same throughout trend period (approximately every two years).
- PMS compliance is increasingly challenging due to reduction in formal maintenance training.
- Over a period of 10-12 years, this has led to a reduction in supervisory-level maintenance expertise and compliance oversight. Sailors have become operators vice maintainers. They do not understand PMS checks and lack technical knowledge. Perception that PMS not important; they don't fix things and they don't feel ownership for equipment.

While individual discrepancies might seem insignificant, they all paint a troubling overall picture of a lack of knowledge and experience, as well as insufficient deckplate supervision.

Recommended Fixes

- Review 2-week A school CBT/OJT when report to ship model. Shipboard OJT competes with inspections, visits, manning shortfalls. Weak supervisory knowledge. Recent changes to high-voltage training pipeline could be the model.
- Oversight through PMS spot checks must be emphasized. Becoming a lost art: supervisors require training, must be TYCOM, ISIC, CO/XO priority.
- Zone Inspections critical. Best safety survey results are on ships with effective zone inspection programs. Builds ownership, maintains material readiness, reduces inspection preps. This is a priority focus for the Afloat Directorate in FY13.

Recent Afloat Initiatives

- Informative emails to SME distribution lists.
- Fleet safety seminars with SME discussions.
- Providing last survey results to the safety officer during the scheduling process. Improves safety readiness by having ships concentrate on previous hits.
- New database survey program with pre-filled fields for deficiencies cut team admin time in half, allowing more time on the deck-plates.
- Improved relations with NAVSEA, particularly SEA05R and SEA05SR. This relationship has proved invaluable in tackling major design issues that conflict with existing instructions.
- SMEs are heavily engaged with outside working groups. Providing direct fleet feedback to INSURV Standards Conference, Fall Protection, Deck and DC, Electrical Safety, Rating HPRRs, NSTM and TUM revision panels.

10. Twenty-Year and Ten-Year Mishap Trends

Navy 20-Year Mishap Trends, Off-Duty and On-Duty

The following charts show how FY12 compares to long-term trends in PMV mishaps. This history highlights the generally improving trend in safety data as we go from high to low rates or color shifts from red to orange to yellow to green.

Before looking at the charts and reading the comments, an important explanation is necessary: the meaning of the term "statistically significant." Because the data generated by complex systems (such as reported military mishaps) show considerable variation—especially in the short term—you can't just glance at a bar chart and tell if things are getting better or worse. To help make inferences drawn from statistical analysis more reliable, statisticians predict the degree of spread around a known average rate of occurrence, and test the likelihood of deviations. These calculations help determine whether differences were the result of chance or were due to other factors (such as a new policy, a new type of risk or a significant change in behavior).

20-Year Fatality History: Off Duty

Off-Duty Navy Fatality Data										
	PMV-4		PMV-2		Ped/Bike		PMV		Off-Duty/Rec	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
1992	97	16.81	16	2.77	12	2.08	125	21.66	41	7.1
1993	87	16	22	4.05	8	1.47	117	21.52	38	6.99
1994	60	12.05	20	4.02	6	1.21	86	17.27	26	5.22
1995	62	13.44	21	4.55	5	1.08	88	19.07	33	7.15
1996	53	11.97	10	2.26	8	1.81	71	16.04	18	4.07
1997	61	14.51	11	2.62	4	0.95	76	18.08	19	4.52
1998	44	10.78	12	2.94	5	1.22	61	14.94	27	6.61
1999	51	12.81	15	3.77	5	1.26	71	17.84	17	4.27
2000	39	9.81	14	3.52	1	0.25	54	13.59	22	5.54
2001	45	11.09	12	2.96	2	0.49	59	14.54	20	4.93
2002	54	13.04	15	3.62	7	1.69	76	18.35	21	5.07
2003	41	10.02	23	5.62	3	0.73	67	16.37	20	4.89
2004	42	10.3	25	6.13	6	1.47	73	17.9	22	5.39
2005	33	8.28	22	5.52	6	1.51	61	15.31	21	5.27
2006	50	12.87	27	6.95	2	0.51	79	20.34	15	3.86
2007	33	8.8	19	5.07	1	0.27	53	14.13	13	3.47
2008	30	8.24	33	9.06	4	1.1	67	18.39	21	5.77
2009	18	5.17	14	4.02	3	0.86	35	10.06	14	4.02
2010	18	5.18	13	3.74	1	0.29	32	9.22	7	2.02
2011	8	2.35	16	4.71	2	0.59	40	7.65	10	2.94
2012	15	4.51	20	6.01	7	2.25	42	12.63	6	1.8

The chart above highlights two related issues. First, although we may try to address these issues as if they are controlled systems, a

significant randomness factor will occasionally produce a statistically significant high rate, even during a period of otherwise low rates. Sometimes a cause for these can be identified (e.g., sport bikes in PMV-2) and sometimes they can't (e.g., the 25-year high rate in pedestrian/bike).

Second, note the 20-year lows (circled) in some fatality rates and counts, which in areas occurred for the first time back in the 1990's when we had a significantly larger force.

As pointed out earlier, the PMV-2 data does not have the typical decreasing trend of the other categories.

On-Duty Navy Class A Mishap Data

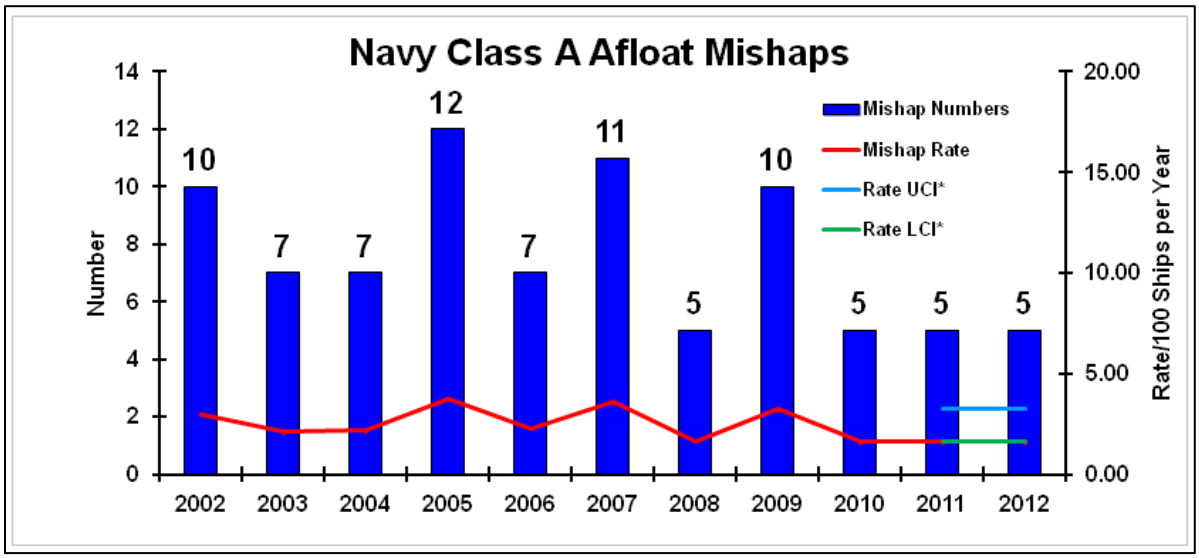
	Flight		Afloat		Surface Ship		Submarine		Dive		Shore*		Op MV		PT	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate
1992	37	2.39	15	2.92	14	3.60	0	0.00	1	0.19	11	1.91	8	1.39	3	0.52
1993	36	2.49	10	2.02	9	2.43	0	0.00	1	0.20	8	1.47	5	0.92	5	0.92
1994	20	1.58	10	2.18	6	1.77	1	0.83	3	0.65	10	2.01	5	1	2	0.4
1995	22	1.78	15	3.55	11	3.54	3	2.69	1	0.24	4	0.87	2	0.43	4	0.87
1996	21	1.69	7	1.72	6	1.97	1	0.97	0	0.00	6	1.36	6	1.36	6	1.36
1997	15	1.29	8	2.00	7	2.33	1	1.01	0	0.00	7	1.66	5	1.19	3	0.71
1998	27	2.32	4	1.05	2	0.68	2	2.23	0	0.00	5	1.22	6	1.47	9	2.2
1999	9	0.78	10	2.81	9	3.25	1	1.26	0	0.00	5	1.26	6	1.51	0	0
2000	20	1.79	12	3.51	12	4.51	0	0.00	0	0.00	5	1.26	5	1.26	3	0.75
2001	14	1.25	8	2.37	6	2.27	1	1.36	1	0.30	7	1.72	2	0.49	3	0.74
2002	21	1.76	10	2.97	7	2.66	3	4.11	0	0.00	2	0.48	5	1.21	9	2.17
2003	26	2.28	7	2.11	5	1.93	2	2.74	0	0.00	2	0.49	2	0.49	6	1.47
2004	12	1.19	7	2.16	5	1.99	1	1.37	1	0.31	4	0.98	4	0.98	5	1.23
2005	13	1.46	12	3.77	10	4.10	2	2.69	0	0.00	3	0.75	2	0.5	8	2.01
2006	14	1.55	7	2.27	5	2.11	2	2.81	0	0.00	4	1.03	2	0.51	8	2.06
2007	9	0.98	11	3.58	7	2.96	4	5.63	0	0.00	3	0.8	2	0.53	2	0.53
2008	14	1.51	5	1.63	4	1.70	1	1.40	0	0.00	7	1.92	4	1.1	1	0.27
2009	11	1.17	10	3.24	7	2.96	2	2.78	1	0.32	9	2.59	0	0	3	0.86
2010	7	0.78	5	1.62	4	1.69	0	0.00	1	0.32	1	0.29	0	0	5	1.44
2011	9	0.96	5	1.62	2	0.84	3	4.17	0	0.00	3	0.88	3	0.88	2	0.59
2012	9	0.99	5	1.62	4	1.84	0	0.00	1	0.32	1	0.3	2	0.6	3	0.96

For Navy on-duty Class A mishaps (shown above), fatalities generally show a downward trend across all areas in the 20-year period. The three exceptions to this appear to be submarines and PT, which have definite mid-period peaks, and diving, which seems to have a mid-period low and to be currently rising. However, with the exception of 1994, no diving year has more than one fatality. A similar argument can be made with respect to submarine fatalities in that the numbers are low and good overall, and (for it and PT) that they have had generally improving trends since the mid to late 2000s.

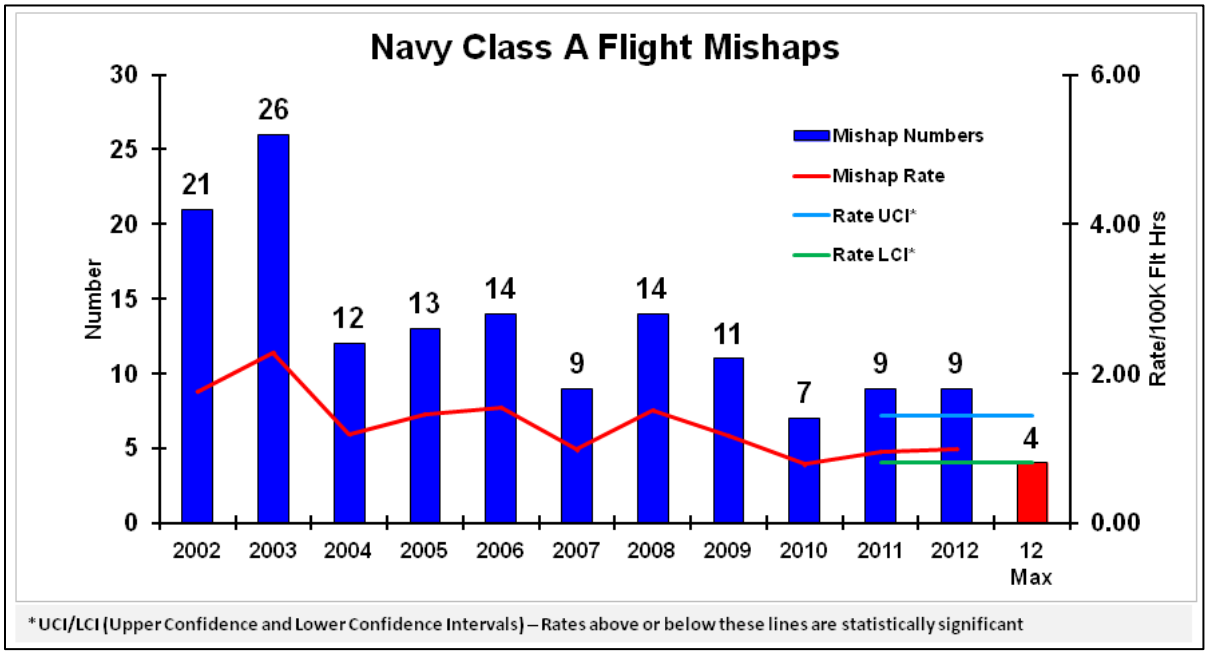
20-Year Fatality History: On Duty

On-Duty Navy Fatality Data																
	Aviation		Afloat		Surface Ship		Submarine		Diving		Shore*		Op MV		PT	
	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count	Rate	Count		Count	Rate	Count	Rate
1992	42	2.71	12	2.34	11	2.83	0	0	1	0.19	4	0.69	8	0.52	3	0.52
1993	31	2.14	7	1.41	6	1.62	0	0	1	0.2	3	0.55	5	0.74	5	0.92
1994	10	0.79	6	1.31	3	0.89	0	0	3	0.65	4	0.8	5	0.2	2	0.4
1995	11	0.89	6	1.42	5	1.61	0	0	1	0.24	1	0.22	2	0.65	3	0.65
1996	20	1.61	3	0.74	3	0.99	0	0	0	0	2	0.45	6	0.68	6	1.13
1997	15	1.29	2	0.5	2	0.67	0	0	0	0	3	0.71	5	0.24	3	0.71
1998	21	1.81	1	0.26	1	0.34	0	0	0	0	1	0.24	6	0.24	9	2.2
1999	7	0.61	4	1.12	4	1.45	0	0	0	0	3	0.75	6	0.75	0	0
2000	19	1.7	4	1.17	4	1.5	0	0	0	0	3	0.75	5	0.5	3	0.75
2001	16	1.42	3	0.89	2	0.76	0	0	1	0.3	6	1.48	2	0.25	3	0.74
2002	15	1.26	5	1.49	5	1.9	0	0	0	0	2	0.48	5	0.72	9	2.17
2003	10	0.88	2	0.6	2	0.77	0	0	0	0	2	0.49	2	0.24	6	1.47
2004	5	0.49	3	0.93	3	1.2	0	0	0	0	2	0.49	4	1.23	4	0.98
2005	7	0.78	5	1.57	4	1.64	1	1.35	0	0	1	0.25	2	0.5	8	1.76
2006	12	1.33	0	0	0	0	0	0	0	0	1	0.26	2	0.51	8	1.8
2007	14	1.53	4	1.3	2	0.85	2	2.81	0	0	1	0.27	2	0.27	2	0.53
2008	6	0.65	2	0.65	1	0.42	1	1.4	0	0	6	1.65	4	0.55	1	0.27
2009	6	0.64	4	1.3	3	1.27	0	0	1	0.32	3	0.86	0	0	3	0.86
2010	7	0.78	3	0.97	2	0.84	0	0	1	0.32	0	0	0	0	5	1.15
2011	2	0.21	0	0	0	0	0	0	0	0	1	0.29	2	0.59	2	0.59
2012	2	0.24	3	1.06	2	0.92	0	0	1	0.35	0	0	2	0.64	3	0.96

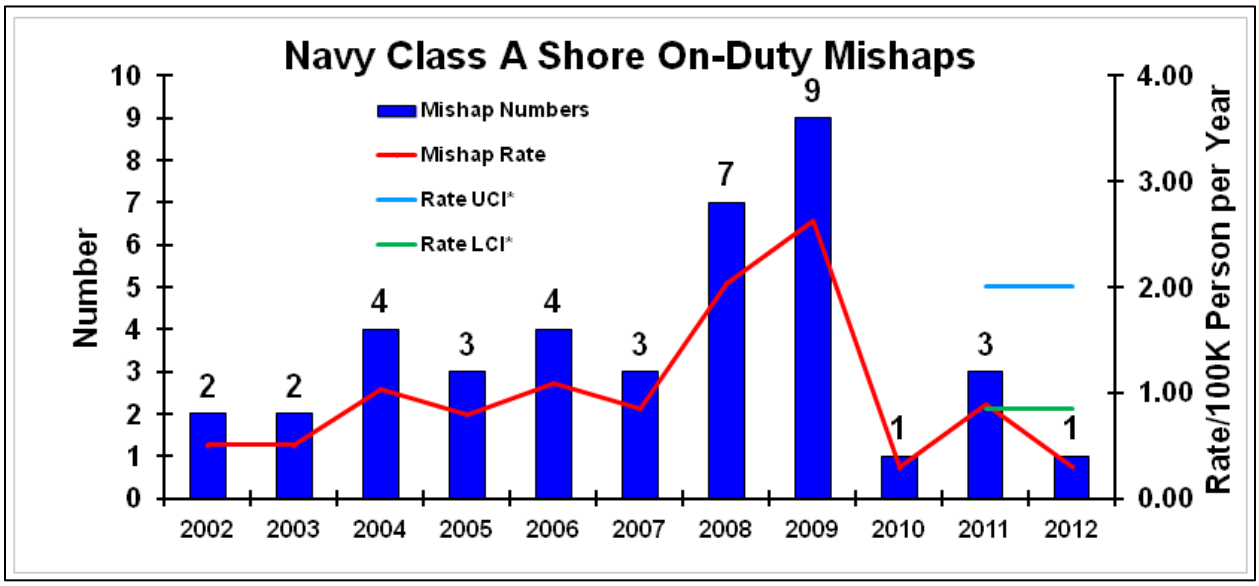
Multi-Year Trends for Major Mishap-Reduction Categories



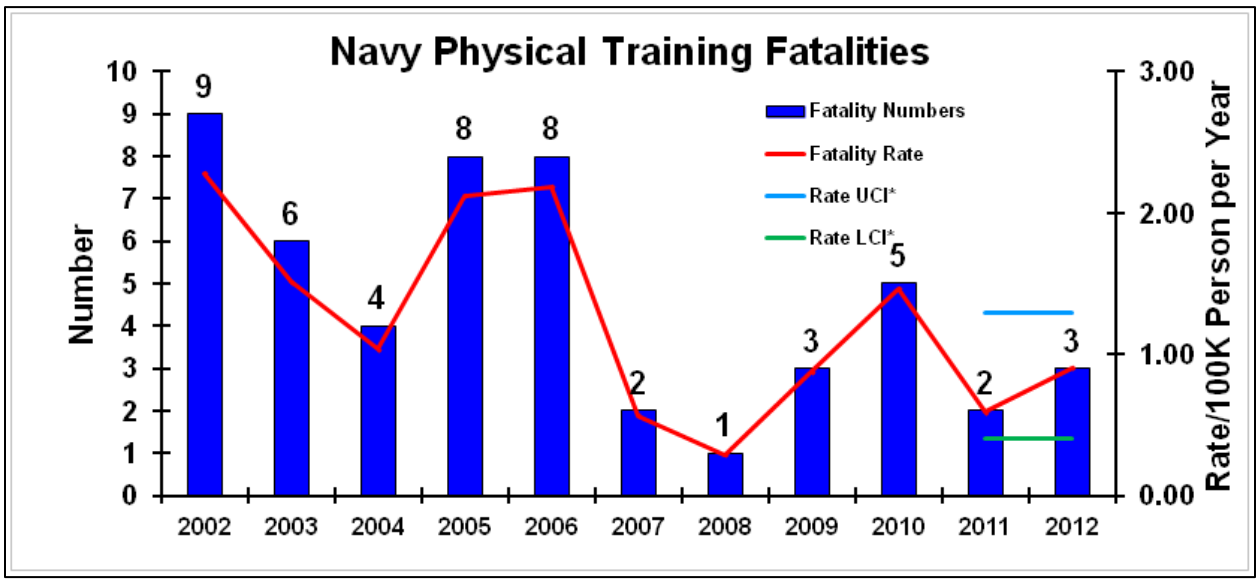
Statistically comparing the rates from FY02 to FY04 to the rate in FY05, the FY05 rate is statistically significantly higher than the rates from the previous years. The FY08 rate is statistically significantly lower than the rates of the previous five years (FY03 to FY07). The FY10 rate is statistically significantly lower than the rates of the previous 5 years (FY05 to FY09). The FY11 rate is statistically significantly lower than the rates of the previous 5 years (FY06 to FY10). Comparing the FY11 and FY12 rates to the rates from FY05 to FY09, both of the rates are statistically significantly lower than the rates from FY05 to FY09, possibly indicating the start of a statistically significant decreasing shift.



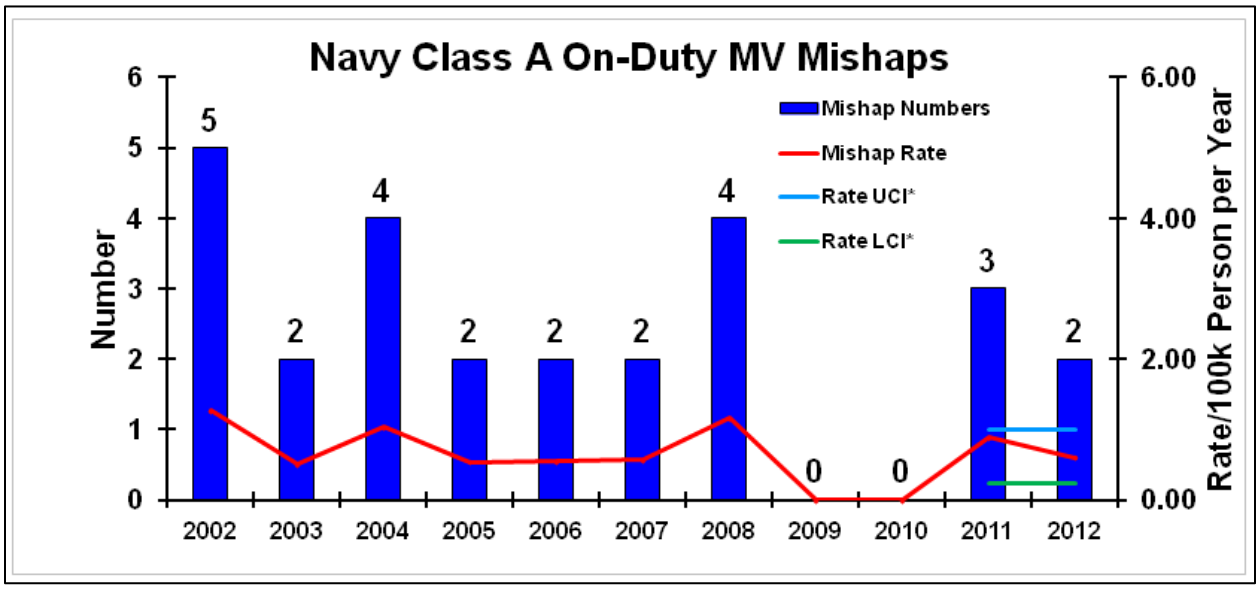
A statistically significant spike occurred in FY03. FY04, FY07 and FY10 are statistically significantly lower than the previous five years. A trend seems to be developing starting in FY04: a statistically significantly lower year followed by two years of no difference. If the trend continues, the FY13 rate would be a statistically significantly lower than the previous five years.



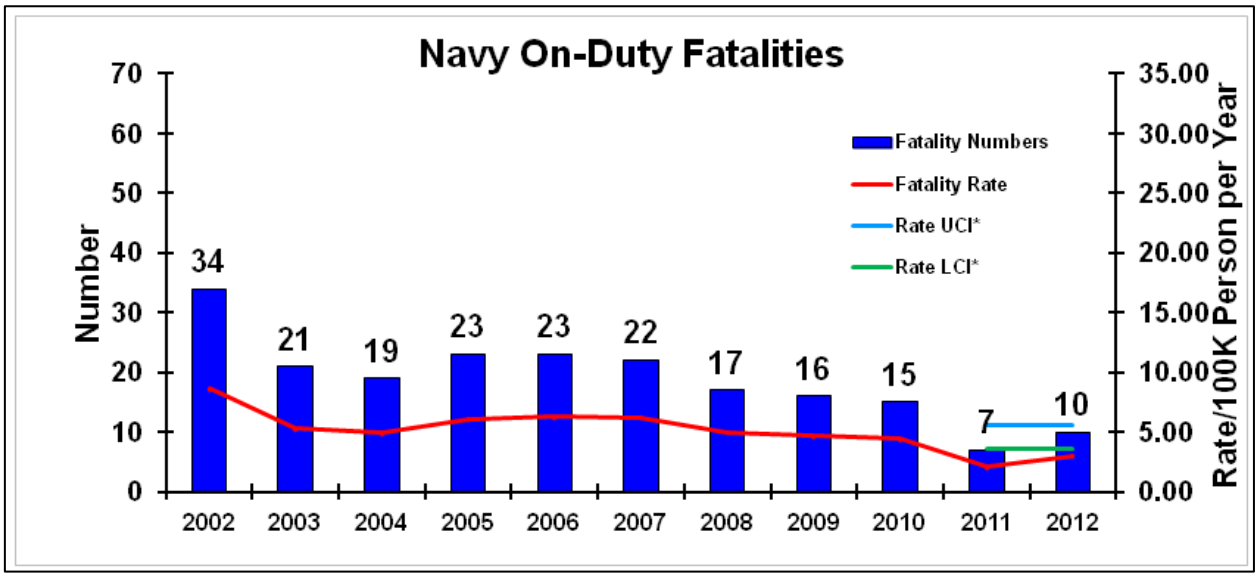
FY08 and FY09 rates are statistically significantly higher than the rates from the previous five years. FY10 and FY12 are statistically significantly lower than the rates from the previous five years. The FY10 and FY12 rates are statistically significantly lower than the rates from FY03 to FY07.



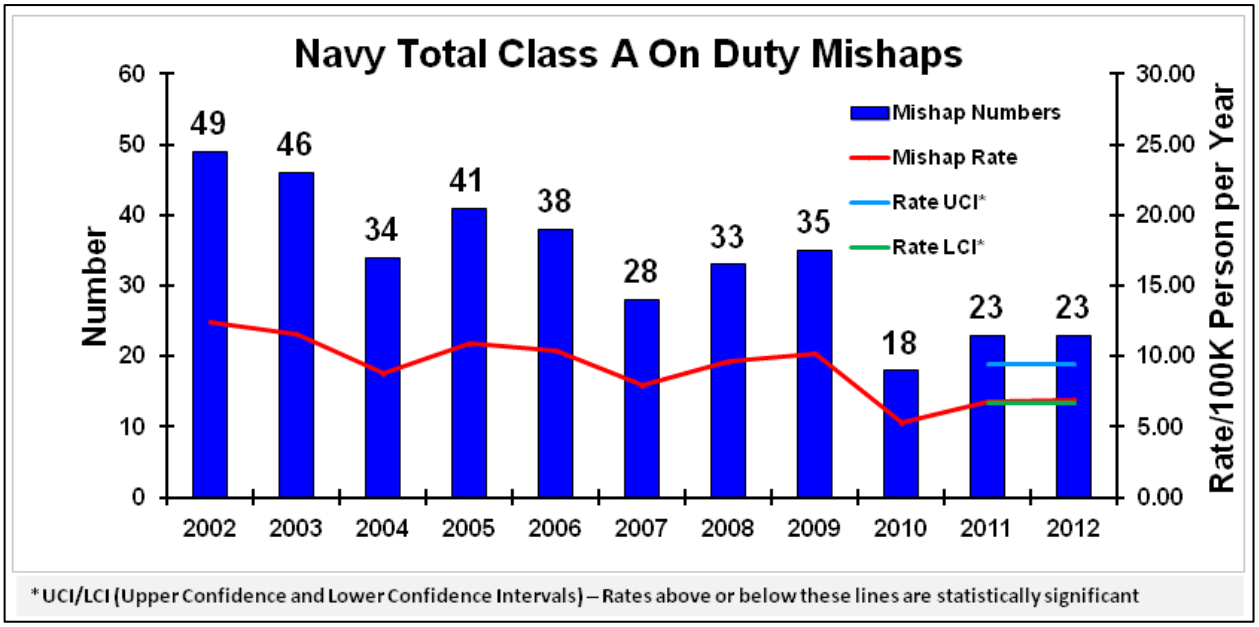
FY02, FY05 and FY06 rates are statistically significantly higher than the rates from the previous five years. FY07, FY08 and FY11 rates are statistically significantly lower than the rates from the previous five years. Comparing the rates from FY07 - FY12 to the rates from FY02 to FY06, all but the FY10 rate are statistically significantly lower, indicating a statistically significant decreasing shift occurred in FY07.



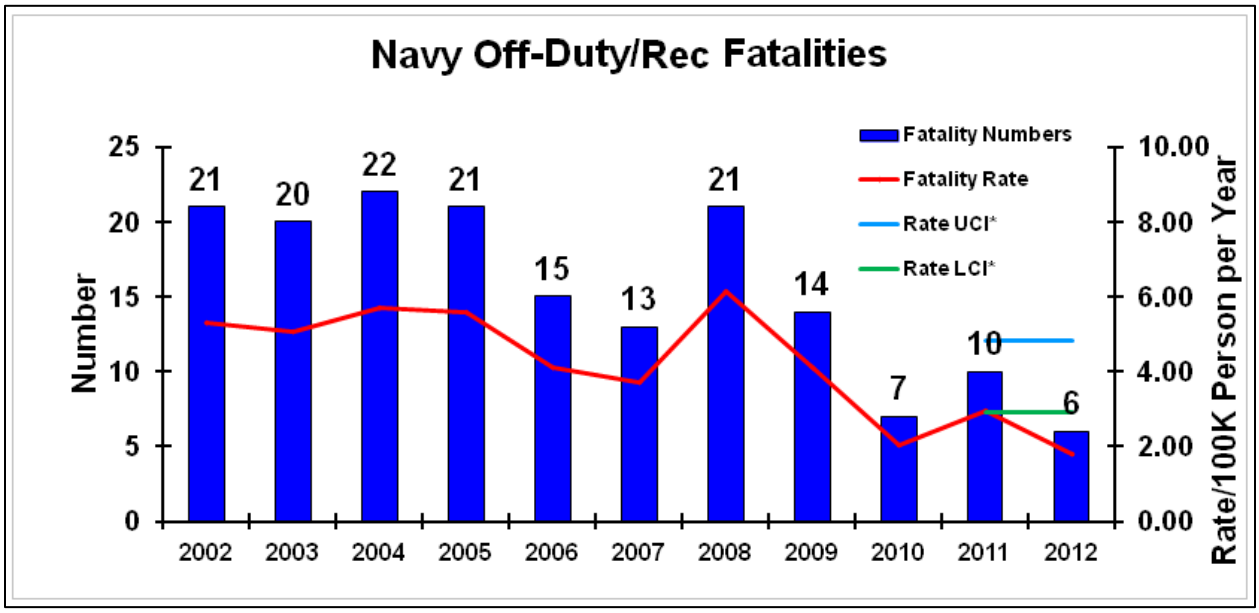
FY03, FY05, FY09 and FY10 rates are statistically significantly lower than the rates from the previous five years. FY08 rate is statistically significantly higher than the rates from the previous five years. The number of mishaps from FY96 to FY01 ranged from five to six except in FY01 (two mishaps). Comparing the rates in the graph to the rates from FY96 to FY01, the FY03 rate is statistically significantly lower than the FY06 to FY01 rates. Starting in FY05, the rates are statistically significantly lower except for the rate in FY08, indicating a statistically significant decrease in FY05.



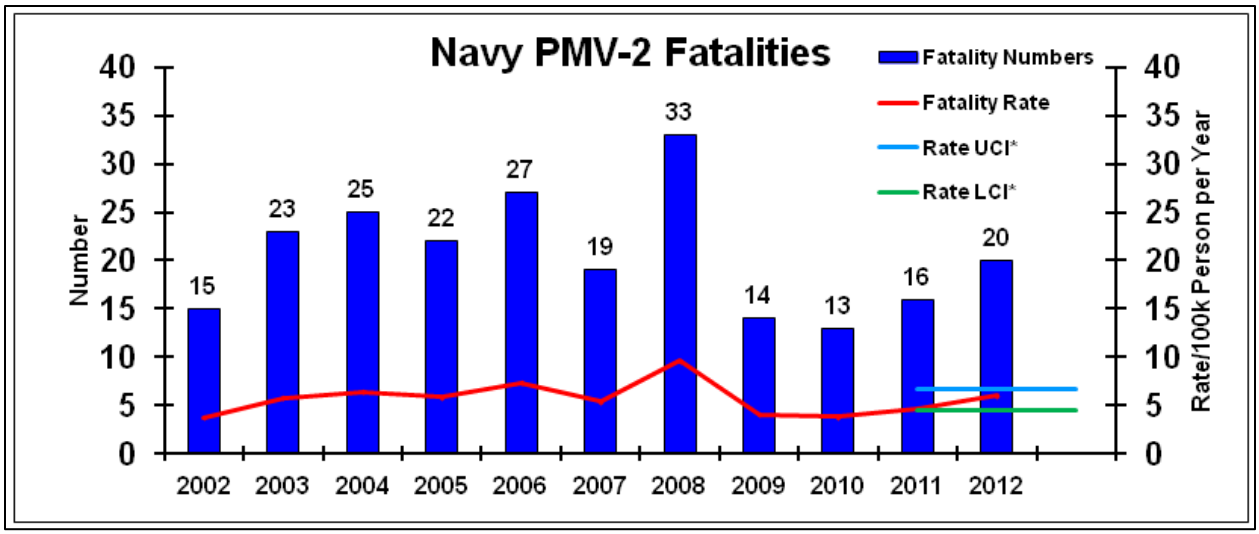
The FY04, FY07, FY10, and FY11 are statistically significantly lower than the rates from the previous five years. Statistically comparing the FY11 and FY12 rates to the rates from FY05 to FY09, both rates are statistically significantly lower, indicating a statistically significant downward shift occurring in FY10.

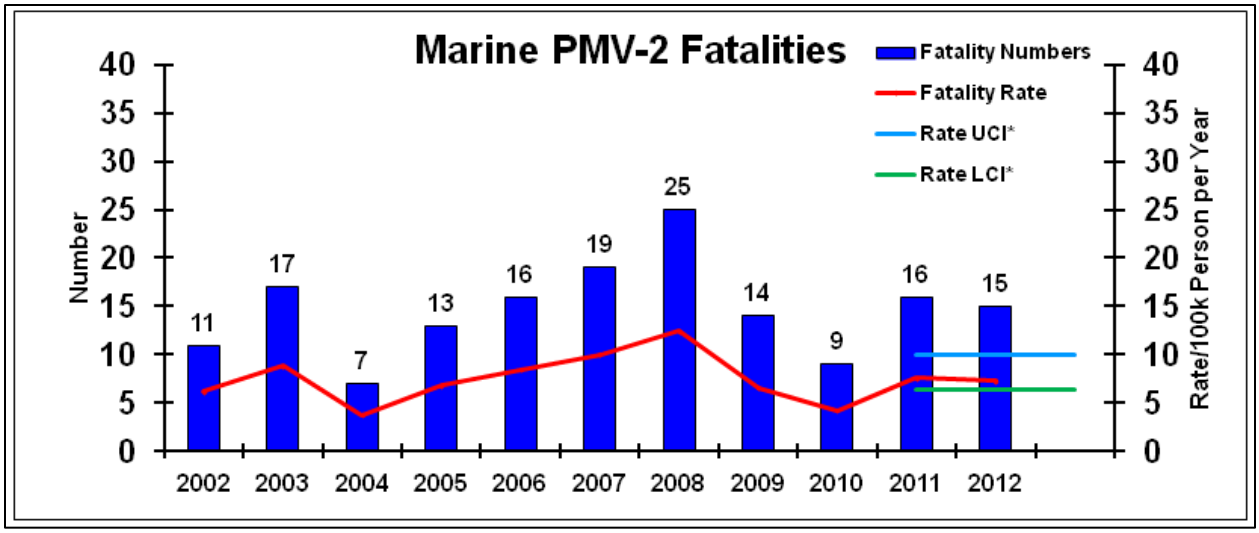


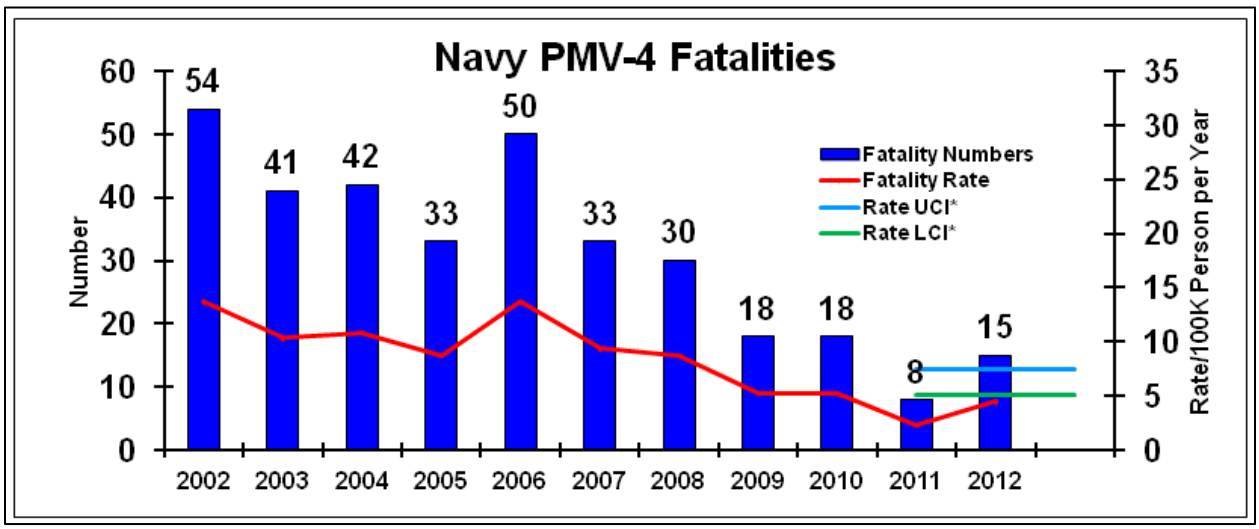
The FY02 rate is statistically significantly higher than the rates from the previous five years. The FY03 and FY04 rates are statistically significantly lower than the rates from the previous five years. The FY10, FY11 and FY12 rates are statistically significantly lower than the rates from the previous five years, indicating a statistically significant downward shift occurred in FY10.



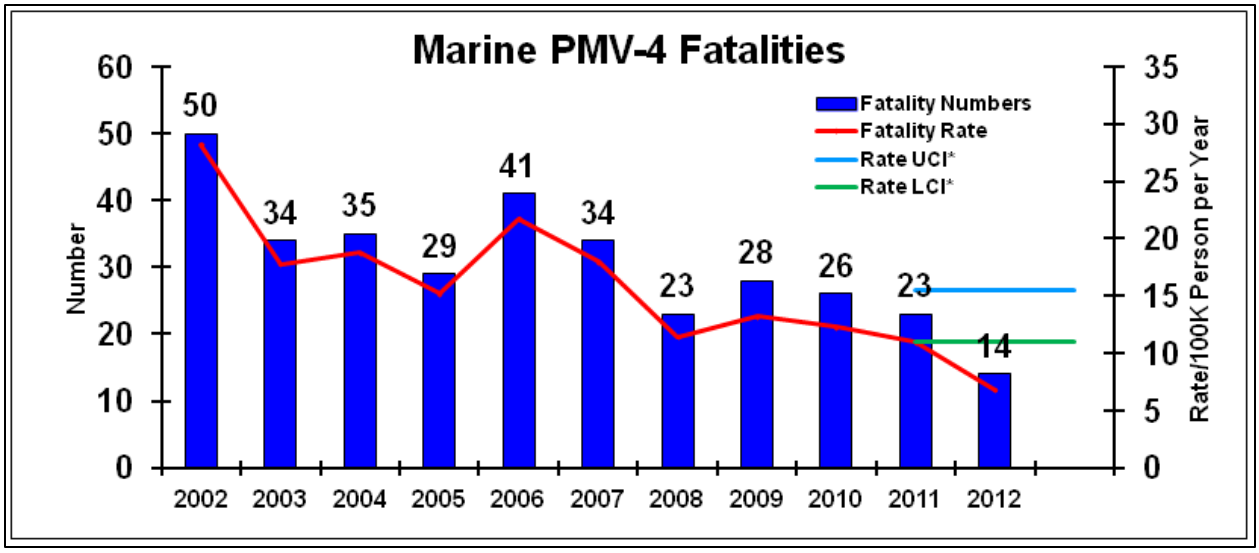
The rates stating in FY06 are all statistically significantly lower than the rates from the previous five years except for the spike in FY08. Comparing the FY09 rate to the rates from FY03 to FY07, the FY09 is statistically significantly lower. A statistically significant downward shift occurred in FY06. Comparing the FY10, FY11 and FY12 rates to the rates from FY06 to FY09 excluding the spike in FY08, the FY10 and FY11 rates are statistically significantly lower. The continued statistically significant lower rates in FY13 and beyond would indicate a statistically significant downward shift occurred in FY10.



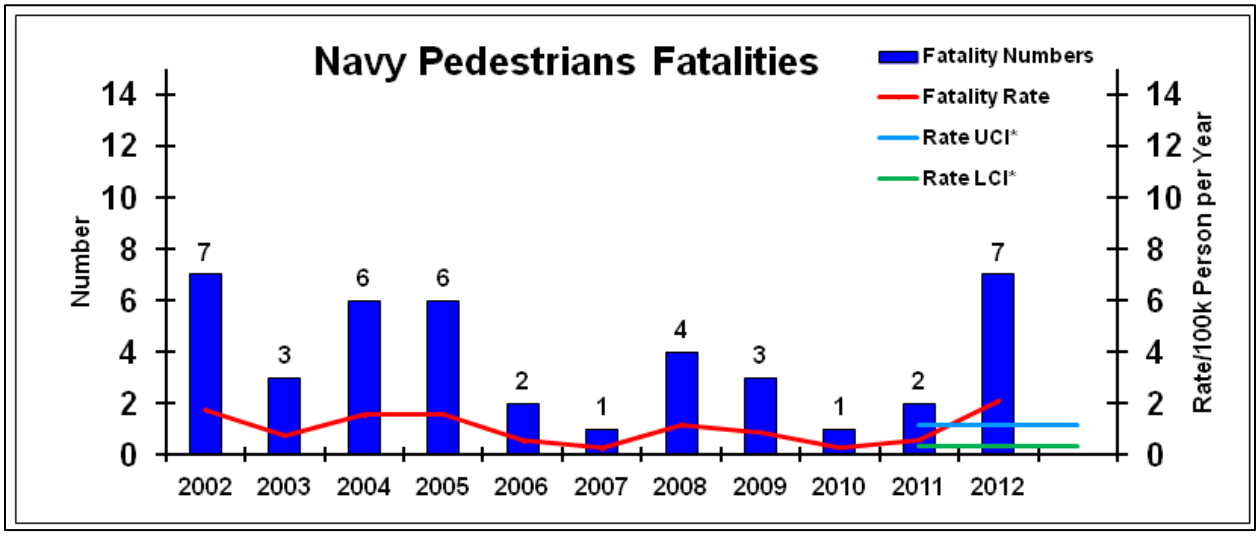




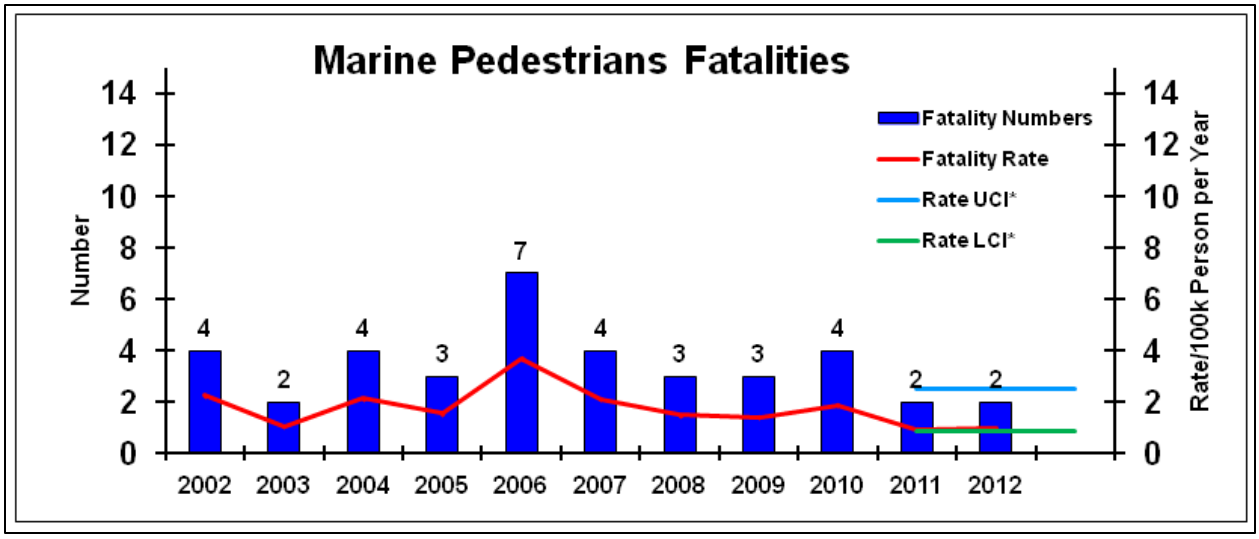
The FY07 rates are statistically significantly lower than the rates from the previous five years (FY02-06). The FY08 rates are also statistically significantly lower than the rates form FY02-06, indicating a statistically significant downward shift has occurred to the rate in FY07. There also seems to have been another statistically significant downward shift in FY09. Statistically comparing the FY09 rates to the rates from FY07 and FY08, the FY09 rate is statistically significantly lower. The same is true for the rates for FY10, FY11 and FY12. Although there appears to be another shift in FY08, the statistically significantly lower rate in FY11 seems to be an anomaly since the FY12 rate is not statistically significantly lower than the rates from FY09-10.



A statistically significant downward shift in the rate occurred in FY08. The rates ranging from FY08 to the current FY12 are statistically significantly lower than the rates from the previous five years. The rates from FY08 to current FY12 are statistically significantly lower than the rates from FY03 to FY07, indicating the shift. Statistically comparing the FY12 rate to the rates after the shift (FY08 to FY11), the current FY12 rates is statistically significant lower.



A statistically significant downward shift occurred in FY06. The FY06 and FY07 rates are statistically significantly lower than the rates from FY02-05. The FY08 rate is statistically significantly higher than the rates from FY06-07. The FY10 rate is statistically significantly lower than the rates from FY06-09, and the FY11 rate is not statistically different from the rates from FY06 to FY11. The FY12 rate is statistically significantly higher than the rates from FY07-11.



There is a statistically significant spike in FY06. Eliminating the FY06 data from the calculations, no other fiscal year rate was statistically significantly different than the previous year's rates until FY11 and FY12. Both the FY11 and FY12 rates were statistically significantly lower than the rates from the previous years, indicating a statistically significantly downward shift in FY11.