

# PropellerSafety.com

propeller guard information center

To: U.S. Coast Guard, DHS  
Reference: Docket No. USCG-2011-0497

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Thank you for the opportunity to comment on this Advanced Notice of Proposed Rulemaking (NPRM) on Recreational Vessel Propeller Strike and Carbon Monoxide Poisoning Casualty Prevention. All of our comments pertain to the propeller strike sections of the NPRM.

Our comments are indexed by number below.

## **Comment Number**

1. USCG Propeller Strike Research Began Prior to Mid 1990's
2. The Houseboat Propeller NPRM Was Economically Justified
3. Hazards of Non-Rotating Propellers
4. Boating Industry Banned "Don't Wreck Your Summer", USCG Propeller Safety PSA
5. Cost of Propeller Accidents
6. Identify Vessels for Mandatory Measures
7. Speculate Why Boaters Would Choose More Expensive Systems
8. Warn of SBA's Previous Errors on the Houseboat NPRM
9. Warn of SBA's Errors Calculating Impact on Small Entities in Houseboat NPRM
10. Define Propeller Danger Zone
  
11. Legal Exposure of Boat Builders Still Using Short Ladders
12. More Dangers of Non-Rotating Propellers
13. Boarding Ladders and Swim Platform Interlocks
14. Other Scenarios For Turning Off the Engines
15. How Effective Would Turning Off the Engine be Against Propeller Strikes
  
16. Interlock Industry Standards
17. Other Devices That Could Prevent Propeller Strike Casualties
18. Other Strategies For Preventing Propeller Strike Casualties
19. Once Again Warning of SBA's Previously Misleading Comments

**PGIC Comment 1 - Section III (Background) Propeller Strike-Related Casualties.**

“Since the mid-1990’s the Coast Guard has investigated the appropriate course of action to address propeller strike-related casualties.”

What about the USCG report, “Struck by Propeller Accidents 1978” by Freund and submitted by USCG to the Department of Transportation in 1979, and many other USCG studies prior to the mid 1990’s?

Reason - point out the investigation has been going on for decades with little action to show for it. We have several news reports of U.S. recreational boat propeller fatalities and gruesome injuries that happened over a century ago. It is time for action.

**PGIC Comment 2 - Section III (Background) Propeller Strike-Related Casualties.**

The second proposed rulemaking that focused on houseboats (USCG-2001-10163) was withdrawn in October 2007 in part due to “the potential costs of installing propeller guards.”

We proved the economic portion of that decision was made in error. Our analysis is thoroughly documented in the 2010 report, “Houseboat Propeller Injury Avoidance Measures Proposed and Withdrawn by the U.S. Coast Guard: An Analysis by the Propeller Guard Information Center” available at:

<http://www.propellersafety.com/wordpress/wp-content/uploads/houseboat-propeller-guards.pdf>

Propeller guards were not required, they were just one of the methods (and the most expensive method) of complying.

Reason - discussions of the USCG-2001-10163 proposal continue to state it was not economically feasible, however we proved it was economically justified based on the data at that time. We are trying to prevent this misinformation from being perpetuated.

**PGIC Comment 3 - Section III (Background) Propeller Strike-Related Casualties.**

“If the propeller is spinning while a person is attempting to use the lower unit as a step, the person may either step directly onto the spinning propeller or slip off the lower unit of the propulsion system and fall onto the spinning propeller resulting in severe injuries and possibly death.”

The propeller does not have to be spinning for someone to slip off the lower unit and fall onto it to suffer “severe injuries and possibly death”. Even just stepping on a non-rotating propeller can have very traumatic results.

Reason - point out the hazards of non-rotating propellers.

**PGIC Comment 4 - Section III (Background) Propeller Strike-Related Casualties.**

Discussion of USGC's previous efforts to prevent propeller injuries.

The list of USCG efforts failed to include USCG's 2010 Public Service Announcement video titled, Don't Wreck Your Summer. It was banned by the boating industry because they said it showed boating in a bad light.

Reason - point out the industry banned this excellent propeller safety PSA video. Many felt it was a very effective message.

**PGIC Comment 5 - IV.A Information Requested. Item 1.**

Requests data or information on benefits or avoided damages which may result from the use of measures to avoid propeller strike casualties.

Most recent high profile propeller injury court cases include expert testimony (and accompanying reports) on the victim's medical costs, their life care plan (including estimated lifetime medical costs), and related personal challenges. These documents provide a glimpse into the impact of propeller accidents on an individual's life.

For example, Plaintiff's Exhibit P-76 in the Brochtrup trial (Jacob A. Brochtrup v. Mercury Marine and Sea Ray. United States District Court Western District of Texas, Austin Division. Civil No. A:07-CA-643-SS), "Life Care Plan and Cost Analysis for Jacob Brochtrup" by Alex C. Willingham M.D. of Rehabilitation Professional Consultants Inc. Report prepared January 4, 2008 and reviewed April 29, 2009. A marked copy of this report is also available as Exhibit B of item 320-4 in the case docket.

Courtroom News Video (CVN) coverage of the Listman vs. OMC trial is a direct video recording of the evidence presented in the trial concerning the impact of the propeller strike on her life and its economic consequences. That information is summarized on our coverage of the Listman vs. OMC trial available from:

<http://www.propellersafety.com/3106/legal-propeller/listman-omc-propeller/>

However, we suggest you view the CVN video. It is much more detailed and graphic.

In addition, countless news reports document propeller victim hospital stays, rehabilitation challenges, prosthetic costs, community fundraising efforts to meet medical costs, etc. We have assembled a list of many of those costs on our Cost of Propeller Accidents page at:

<http://www.propellersafety.com/cost-of-propeller-accidents/>

Reason - supplying requested information.

**PGIC Comment 6 - IV.A Information Requested. Item 2.**

What vessel types should be considered for mandatory measures?

Rental houseboats (new and those in the field).

Other boats as defined in our Propeller Guard Position Statement:

*“Boat manufacturers should be working in conjunction with marine drive manufacturers, boat dealers, boat retailers, and manufacturers of propeller injury avoidance devices to provide new boats with the appropriate combination of propulsion systems, propeller injury avoidance devices, propeller guards, boat design features, warnings, and additional safety measures as needed to minimize propeller injuries and their severity. We also believe the same group, in conjunction with USCG and state boating safety offices, needs to make sure those operating new boats receive appropriate training in boating safety.*

*In our opinion, the boating industry is not currently shouldering that responsibility. Therefore, we encourage the U.S. Coast Guard (USCG) to establish basic, sensible, realistic, mandatory, performance based regulations requiring the appropriate combination of propulsion systems, propeller injury avoidance devices, propeller guards, boat design features, warnings, and additional safety measures needed to minimize propeller injuries and their severity for all new propeller driven recreational boats.*

*Additionally, similar regulations, including performance requirements, should be established for all new and EXISTING propeller driven rental, taxi, party, charter fishing, tour, charter diving, and excursion boats, based on boat type, length, use, and a risk assessment.”*

Reason - answering the question.

**PGIC Comment 7 - IV.A Information Requested. Item 7.**

Installation costs of propeller safety devices?

We suggest any costs presented by the boating industry (including NMMA and SBA) be carefully reviewed for errors similar to those identified in their submissions to USCG-2001-10163 (the houseboat propeller safety proposal) by our *Houseboat Propeller Injury Avoidance Measures Proposed and Withdrawn by the U.S. Coast Guard: An Analysis by the Propeller Guard Information Center* report.

Our USCG-2001-10163 report is available from:

<http://www.propellersafety.com/houseboat-propeller-safety-regulation/>

Reason - prevent inaccurate information and errors from misleading USCG again.

**PGIC Comment 8 - IV.A Information Requested. Item 11.**

Would boaters choose more expensive systems over standard systems? If so why?

One would speculate that if given the opportunity to “trade up”, some boaters would be willing to spend additional funds for systems that were more user friendly, more reliable, improved performance, perceived to be safer, more aesthetically pleasing, recommended by their peers, from trusted companies, easier to install, last longer, perform additional functions, conveyed a certain status (affluence), bundled with other products or services, available at the right place at the right time in the right size, or were more strongly marketed (advertised). The particular reasons would probably vary by vessel type and use. Boaters would probably be using a similar decision making process used for other boating safety accessories that come with a new boat.

If those purchasing new boats were given a voucher for “x” dollars to be used toward purchasing a device that provides a specific safety feature required on their boat, even more might trade up.

Reason - answering the question.

**PGIC Comment 9 - IV.A Information Requested. Item 16.**

Economic impact on small entities?

See **PGIC Comment 7**. SBA Office of Advocacy committed many errors in their houseboat propeller safety NPRM public comments. SBA used the wrong costs, the wrong accident statistics, the wrong business classification code, and committed numerous other errors (we identified 15 major errors) rendering their analysis meaningless (see pages 102-117 of our houseboat NPRM study). Yet, USCG saw SBA’s letter as “a major challenge to the rule”. DO NOT let them mislead you again. We suggest SBA’s comments on USCG recreational boat propeller safety proposed rules be ignored until SBA publicly responds to the 15 errors we identified in their submission on page 116 of our report AND explain how they will prevent those errors from happening again. Our houseboat NPRM study is available from:

<http://www.propellersafety.com/houseboat-propeller-safety-regulation/>

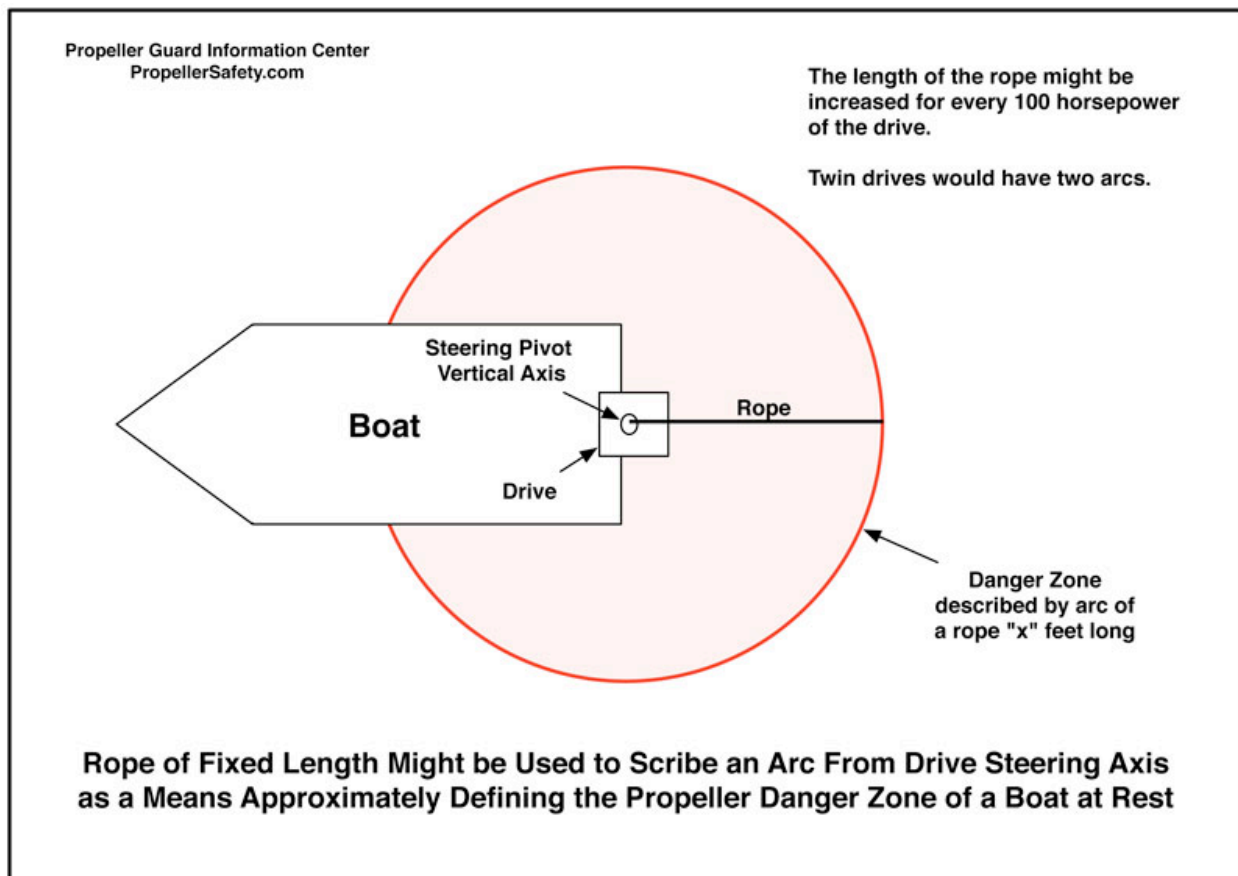
Reason - Prevent USCG from being misled by SBA again.

**PGIC Comment 10 - IV.B Specific Measures. Item 1.**

If an operator turned off the engine when people were in the water in close proximity to the rear of the vessel “persons in the water behind the vessel would not come into contact with a spinning propeller...” USCG suggests defining “Close Proximity” as a person “touching any part of the vessel or close enough to touch any part of the vessel.”

While we are not commenting on whether this should be a law or not, the definition has some problems. While being close enough to touch any part of the vessel at the stern is definitely in the danger zone, the actual danger zone is much larger.

Being close enough to touch any part of the vessel suggests reaching out with your hands and touching some part of the vessel. That distance is variable depending on age, height, and other human factors of the person in the water. Combining the appendage outlines at the stern with those human factors creates a very complex, person specific danger zone map.



We suggest the “rope method” in the chart above as a place to start a discussion for possible ways to define the propeller danger zone. The arc traveled by a rope “x” feet long with one end held directly above the pivot point of the stern drive or outboard and the other end stretched out and held an equal distance above the water creates a symmetrical danger field. “Y” feet could be added to the rope for each additional 100

horsepower in recognition of larger drives pulling in more water. Twin drives would have two arcs.

We suggest parties interested in prescribing a danger zone review the 1998 ABYC report, "Boat Boarding Ladder Placement", by Miller and Grieser. They describe a Propeller Operating Zone (POZ) to define areas of greatest risk. However Miller and Grieser only focus on where the propeller may be in the future. While Miller and Grieser laid some good basic groundwork, they committed a major error when they failed to recognize a propeller can pull in nearby swimmers, floaters, or those on a boarding ladder when the boat is at rest, or nearly at rest and the propeller is engaged. The danger area is much larger than just where the prop is now or where it might be shortly.

Reason - provide input on the propeller danger zone and how it might be defined.

**PGIC Comment 11 - IV.B Specific Measures. Item 2.**

A possible requirement to use longer boarding ladders on new vessels.

The American Boat and Yacht Council (ABYC) conducted an in water boarding ladder test on April 1-3, 2009 in which people boarded a boat using ladders of different lengths. The test was filmed both above and below water. We suggest boat builders be asked to view the resulting ABYC video titled "Ladder Depth Testing Relating to Propeller Injury" currently online at:

<http://s289313426.onlinehome.us/ppgmarine.tv/laddertest/>

Then imagine explaining to a jury that just watched that video why their boat company decided to stay with short ladders resulting in the defendant's propeller injuries.

Reason - point out the legal exposure of builders continuing to use short ladders.

**PGIC Comment 12 - IV.B Specific Measures. Item 2.**

Those using a shorter boarding ladder may either step directly on the spinning propeller or step on the drive and slip onto the spinning propeller and be injured.

We suggest hundreds are injured by non-rotating propellers in this situation as well.

Reason - point out dangers of non-rotating propellers too.

**PGIC Comment 13 - IV.B Specific Measures. Item 3.**

Possible requirement to use boarding ladder or swim platform entrance gate interlocks.

We feel they should be required when needed as described in our Propeller Guard Position Statement, portions of which are reproduced below:

*“Boat manufacturers should be working in conjunction with marine drive manufacturers, boat dealers, boat retailers, and manufacturers of propeller injury avoidance devices to provide new boats with the appropriate combination of propulsion systems, propeller injury avoidance devices, propeller guards, boat design features, warnings, and additional safety measures as needed to minimize propeller injuries and their severity. We also believe the same group, in conjunction with USCG and state boating safety offices, needs to make sure those operating new boats receive appropriate training in boating safety.*

*In our opinion, the boating industry is not currently shouldering that responsibility. Therefore, we encourage the U.S. Coast Guard (USCG) to establish basic, sensible, realistic, mandatory, performance based regulations requiring the appropriate combination of propulsion systems, propeller injury avoidance devices, propeller guards, boat design features, warnings, and additional safety measures needed to minimize propeller injuries and their severity for all new propeller driven recreational boats.”*

Reason - safeguard boaters by using interlocks in the absence of action by the boating industry.

**PGIC Comment 14 - IV.C Specific Information Sought. Item 2.**

Are there other scenarios in which turning off the engine might protect recreational boaters?

Some possible scenarios are:

1. When people are sitting on the very front of a pontoon boat with their knees hanging over the edge and their feet dangling in or toward the water. A slight jostle of the boat can send them in when the boat is at rest, crossing a boat wake or a large wave can send them in while underway. Either way, the propeller can be on them very quickly.
2. When the boat operator is unable to safely operate the vessel due to being under the influence of drugs or alcohol.

Reason - identify some other scenarios as requested.



**PGIC Comment 15 - IV.C Specific Information Sought. Item 6.**

How effective would turning off the engine when people are in close proximity to the propeller be in preventing propeller strikes?

Yes, if the engine was turned off and the propeller had time to coast down, there would be few spinning propeller strikes.

The problem is trying to turn the engine off before someone is in close proximity to the propeller. Some people enter the water quickly by falling overboard, jumping overboard, or exiting via a water slide. Others are already in the water such as skiers, wakeboarders, tubers, swimmers, floaters, and divers. It would be extremely difficult for an operator to kill the engine before a person entered the water in some situations and equally difficult to kill the engine before encountering someone in the water they did not see.

While the boating industry tries to place the blame on the boat operator or the person in the water, the frequency at which these accidents happen and their severity demands intervention.

Reason - The boating industry has been blaming boat operators and those in the water for decades, but the accidents keep happening. It is time for the industry to address the problem.

**PGIC Comment 16 - IV.C Specific Information Sought. Item 13.**

Are there any consensus industry standards addressing interlocks?

While not specifically addressing “smart” interlocks of the nature of ladder and gate switches, there are two Functional Safety industrial standards that can provide some guidance for those designing virtual propeller guards (sensor based systems). These standards pertain to electronic or software based systems that use sensors to detect a hazardous condition and then activate something that prevents or mitigates the accident. They are more typically applied in a factory / plant shop floor setting.

1. ISO 26262 (International Standards Organization)
2. IEC 61508 (International Electrotechnical Commission)

Note - we are not saying these standards apply to propeller safety devices on recreational boats. We are only saying they can stimulate some ideas.

Reason - identify the standards requested.

**PGIC Comment 17 - IV.C Specific Information Sought. Item 17.**

What other measures or strategies could prevent propeller strike related casualties?

This comment focuses on **devices**. The propeller safety devices we describe below tend to fall into one of the following five categories:

- A. Virtual Propeller Guards (sensor based propeller safety systems)
- B. Conventional Ring and Cage Type Propeller Guards
- C. Enhanced Propeller Guards
- D. Safety Propellers
- E. Alternative Propulsion Methods

These devices range from commercially available products, to inventions built from off the shelf products, to some contributed to generate further discussions. We provide them briefly as a list, then elaborate on each one.

1. Doorbell Enforces Use of Stern Drive Lookout on Larger Vessels
2. Self Adjusting Backup Alarms
3. Doorbell Interlock That Also Activates the Self Adjusting Backup Alarms
4. Circle of Death Propeller Accident Invention
5. RFID Life Jacket Used to Detect Human Presence in Boat Kill Switch Applications
6. Detecting People in the Water in the Danger Zone
7. Backup Video Cameras
8. Captain's Mate by MariTech
9. MariTech Swim Guard and Other Propeller Guards
10. Use of Trim Cylinder Trailout Devices to Reduce Blunt Trauma
11. The Flapper (flap up rear screens for propeller guards)
12. Propeller Guard With Reduced Drag
13. Shock Mounted, Forward Facing, Catchers Mask Propeller Guard Invention
14. Early Flip Up Guards
15. Australian Environmental Safety Propeller
16. RingProp
17. Water Jets
18. Pump Jets

## Virtual Propeller Guards

Virtual propeller guards include the boarding ladder and swim gate interlocks already discussed in this NPRM plus the virtual lanyard systems now on the market (Virtual Lifeline, CAST, and Autotether).

We have previously described several of our virtual propeller guard inventions on PropellerSafety.com including:

1. **Doorbell Enforces Use of Stern Drive Lookout on Larger Vessels** - Doorbell switch on rear deck of houseboat must be pressed and released within a certain time interval before the houseboat will start to ensure someone is at the stern to spot for swimmers.
2. **Self Adjusting Backup Alarms** - Backup alarms for vessels like houseboats that automatically adjust their sound level based on ambient noise levels. They are sounded for a few seconds before the engine is started.
3. **Doorbell Interlock That Also Activates the Self Adjusting Backup Alarms** - A combination of the two approaches above.
4. **Circle of Death Propeller Accident Invention** - System detects the unmanned boat is circling out of control and stops it.
5. **RFID Life Jacket / PFD Used to Detect Human Presence in Boat Kill Switch Applications** - An RFID tag similar to those used in turnpike toll road passes is integrated into a life jacket and acts as a virtual kill switch lanyard. An operator wearing the life jacket automatically communicates their presence to the kill switch AND is protected by a life vest as well. A full invention disclosure is available from:  
<http://www.propellersafety.com/2618/propeller-safety-inventions/rfid-life-jacket-boat-kill-switch/>
6. **Detecting People in the Water in the Danger Zone and Automatically Taking the Appropriate Actions** - Several possible approaches are illustrated on our site. While this approach needs further development, it holds great promise.

The following virtual propeller guards are not our inventions:

7. **Backup Video Cameras** - A monitor at the helm allows boat operator to see the stern and beyond. Backup video cameras are now in use on several larger boats and houseboats with a monitor at the helm. While backup video cameras do not substitute for a live lookout at the stern, there are many situations in which they could prevent propeller accidents.
8. **Captain's Mate by MariTech** - System requires a captain and a mate to work together to make sure the proper procedures are followed on larger boats resulting in fewer propeller injuries at startup. It reinforces pre-launch protocols on larger vessels.

## Conventional Cage and Ring Type Propeller Guards

9. **MariTech SwimGuard and Other Similar Guards** - have many useful applications in their current state of development. We certainly did not invent conventional cage and ring type propeller guards. They have been around for decades.

## Enhanced Propeller Guards

These are also among our inventions previously described on PropellerSafety.com

10. **Trim Cylinder Trailout Devices** - The existing trim hydraulic system can be slightly altered to reduce blunt trauma to humans and marine life. The change is a COST REDUCTION. The new system also reduces damages to propeller guards. See page 135 of our houseboat regulation study available from:

<http://www.propellersafety.com/houseboat-propeller-safety-regulation/>

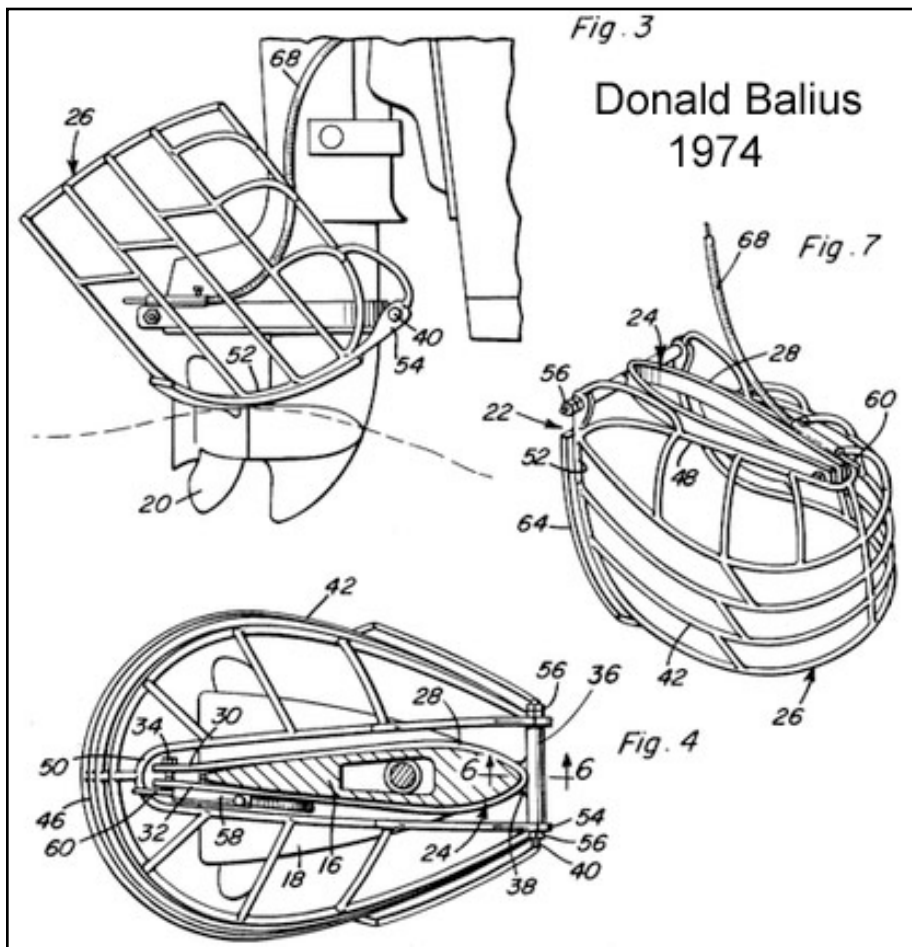
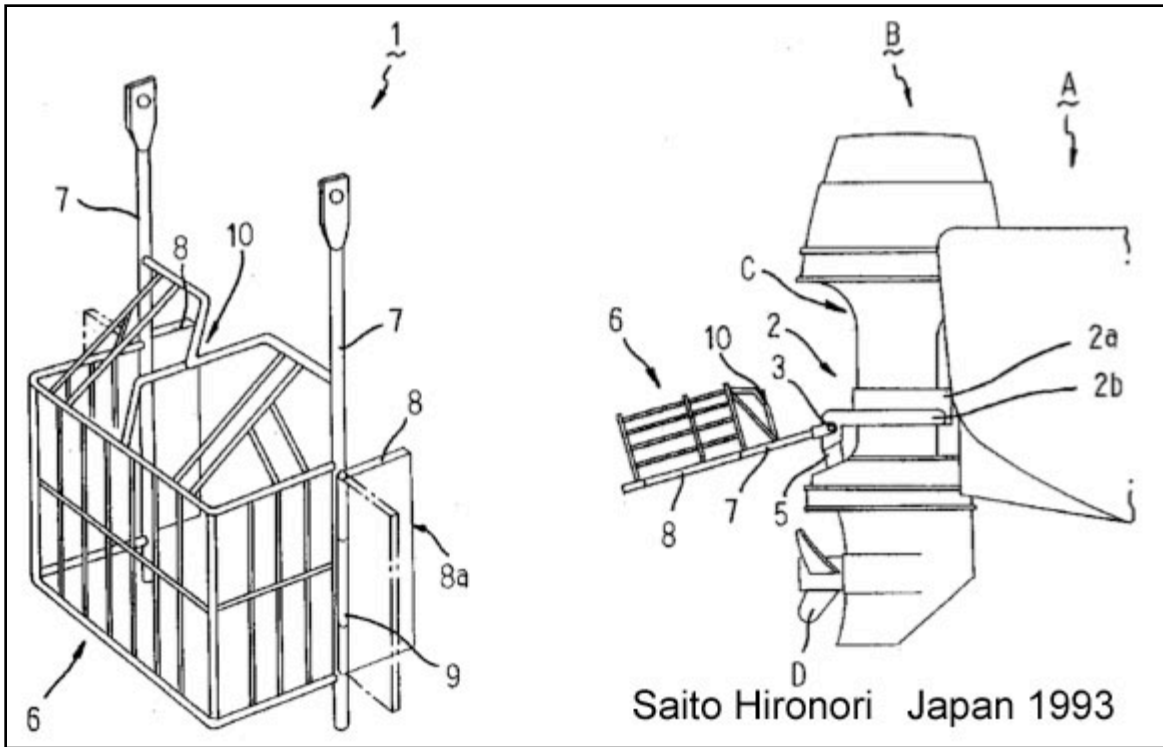
11. **The Flapper** - Propeller guards with rear screens that swing up when underway to reduce drag. Guy Taylor's Navigator 3PO guard with a flip up shield is also in this category.
12. **Propeller Guard With Reduced Drag** - In some situations, larger diameter wires, rods, or struts may actually reduce drag while increasing strength, and durability due to a dip in the drag curve at high Reynolds Numbers.
13. **Shock Mounted, Forward Facing, Catchers Mask Propeller Guard Invention** - Shock mounting a propeller guard with a rounded forward face reduces impact cuts and blunt trauma.

More information about all our inventions described above are available at:

<http://www.propellersafety.com/propeller/propeller-safety-inventions/>

Please note all of our inventions described above, except the RFID Life Jacket Kill Switch, have been placed in the public domain for use by anyone.

14. **Early Flip Up Guards** - Some very interesting ones include the works of Donald G. Balias who developed flip up guards in the 1970's and those of Saito Hironori of Japan who patented a very interesting swing up guard in Japan in 1993. Patent drawings of both of these guards are provided on the next page. The boating industry has outlasted generations of similar entrepreneurs.



## **Safety Propellers**

Neither of these inventions is ours.

15. **Australian Environmental Safety Propeller** - rounded edge of propeller blades provides protection in some situations.

16. **RingProp** - propeller with an integral ring around its perimeter. They are no longer in production.

## **Alternative Propulsion Methods**

Neither of these inventions is ours.

17. **Water Jets** - self explanatory

18. **PumpJets** - self explanatory

Reason - identify other propeller safety measures as requested.

**PGIC Comment 18 - IV.C Specific Information Sought. Item 17.**

What other measures or **strategies** could prevent propeller strike related casualties?

This comment focus on **strategies**. Some are finished ideas while others are contributed to generate further discussions. We provide them as a list, then briefly elaborate on each one.

**Other Strategies For Preventing Propeller Strike Casualties**

1. Technology Prizes
2. Have All States Report Accident Data to Public BARD
3. Technology Forcing
4. Immediately Sign On With NEISS
5. Webcast USCG / ABYC Propeller & Carbon Monoxide Injury Avoidance Meetings
  
6. Propeller Safety Consortium
7. Annual Propeller Accidents Press Release
8. ANSI Z535 Propeller Safety Warnings / Decals / Placards
9. Propeller Fatality Tax
10. Courtroom Holiday
  
11. Require the Industry to Provide a Detailed List of Propeller Guard Performance Criteria
12. Boating Safety Classes
13. Boat Operator Licensing
14. Rental Boat Operator Training
15. Operation Dry Water

**1. Technology Prizes** - guarantee the first to achieve certain performance requirements a large monetary reward or other prize. Technology prizes have long been used to encourage innovation.

For example, large cash awards could be established for the first entrepreneur to accomplish any of the tasks below with a system that also met certain cost, durability, and manufacturability requirements.

- A. Detect when someone has been ejected without them using a lanyard or wearing any special item.
- B. Detect presence of the operator at the helm without using a lanyard or them wearing any special item.
- C. Detect people near the propeller without requiring them to wear any special item. The system will detect any random person in the prescribed danger zone with no special preparation on behalf of the person.
- D. Develop a propeller guard that provides protection while not measurably impacting any performance variables of the boat including top speed, time to plane, handling, steering, porpoising, reverse, cavitation, etc. or creating any other downsides to its use.
- E. Develop a device or method to improve boat operator visibility of fallen skiers, wake boarders, and tubers that are in the water awaiting being picked up that is economical, automatic, and less intrusive than existing methods.

For additional information about technology prizes, see *Creative Financing*. Wall Street Journal. September 27, 2010.

A potential funding source for Technology Prizes is identified later in this section.



**2. Have All States Report Accident Data to Public BARD** - easy way to improve accident data available to those developing boating safety devices and safety programs. As mentioned in our USCG 2010 Boating Accident Report Database (BARD) Has Been Castrated post at:

<http://www.propellersafety.com/2152/propeller-statistics/uscg-2010-bard-castrated/>

The 2010 BARD accident data for over 20 states and several territories is not available to the public. Those states and territories already were or began withholding BARD data in 2010 citing privacy issues.

USCG already redacts most of the private information in the reports as per this quote from the 2010 Boating Statistics report:

“The federal government has redacted private information since the release of it would likely result in an infringement in personal privacy. Private information includes the names, contact information, dates of births, ages and any other identifiable information (driver’s license number, insurance policy number, social security number, etc.) of all individuals involved in the accident.”

As mentioned in our post, we call for the boating industry, boating trade organizations, and USCG to encourage states to restore the missing accident reports from the 2010 BARD database.

The only data field that looks very private to us that remains in Public BARD is the Hull Identification Number (HIN). We are fine with truncating it AFTER the prefix that identifies the boat builder.

Tell the states refusing to furnish their data boating that not having access to that data places safety professionals and boating safety equipment designers at a disadvantage in identifying trends, clusters, accident causes, and potential solutions. As a result, those states are placing their own citizens at increased risk of being involved in boating accidents, as well as the rest of the United States. Offer to truncate the HIN number after the prefix identifying the boat builder and get them back in the fold.

The absence of nearly half of the data severely cripples the usefulness of Public BARD. Yes, we can still request special reports from USCG, but part of the inspiration for new ideas comes from being hands on with the BARD data in real time and the ability to drill down to dozens of data fields describing each accident.

Additionally, we have spotted many errors in BARD data in the past. Putting BARD data behind a curtain where we cannot see it, muzzles us and other watchdogs. It leaves those working on boating safety issues at the mercy of USCG furnished data that may contain major errors. Thus future boating safety decisions made upon individual accident reports or statistical data may be made in error. Surely States do not want to see their state and federal tax dollars wasted and their citizens killed and maimed at the same time.

**3. Technology Forcing** - is when a regulating agency sets a standard that cannot be met with existing technologies, at least not at an acceptable cost. Technology forcing has been used several times on the automotive industry. It has arguably been used several times on the boating industry by the Environmental Protection Agency (EPA) (standards reducing exhaust emissions forced the move to higher power density four strokes and cleaner two strokes, and standards to reduce fiberglass emissions led to adoption of new layup methods). See, A Brief History of Technology-Forcing Motor Vehicle Regulations. EM. June 2009. Pages 4-8.

<http://www.nescaum.org/documents/a-brief-history-of-technology-forcing-motor-vehicle-regulations/>

Just a few years ago the boating industry said catalytic converters on boats were impossible. They said:

- A. Engine exhausts are wet on boats, but they have to be dry and hot for catalytic converters.
- B. Engines would lose performance (output horsepower) and the associated top speeds.
- C. Converters are too hot for engine compartments.
- D. Catalytic converters will not live in a wet environment, let alone in a salt water environment.

When Indmar, one of the smallest players, started selling inboards with catalytic converters back in mid 2006 with no measurable power loss, it became a little harder to say it was impossible.

Now stern drives and inboards regularly use catalytic converters and achieve the same or better performance (output horsepower).

*Polluting for Pleasure* by Andre Mele discusses the use of catalytic converters on boats and states, "Technology-forcing is slowly changing the availability picture for land vehicles, however, and there is no reason to suppose the same thing can't happen for marine vehicles as well." Mr. Mele made that statement back in 1993.

Technology forcing also brought us the new cleaner recreational boat diesel engines that meet the tier standards.

The same principles could be used to force the boating industry to protect people from propellers. A standard could be crafted to protect people in certain situations by a specific date. The industry already has countless technologies within their reach, but they just keep saying nothing is available off the shelves. Little is available off the shelves because the boating industry starves out propeller safety entrepreneurs by dissing their products and voiding consumer boat and drive warranties if they use them. Robert Hooper (Prop Buddy) passed away in 2010. The industry outlasted him. Who will be next?

Technology forcing is a tool that can be used to overcome the decades of technology suppression committed by the boating industry. Use it.

4. **Immediately Sign On With NEISS** - an emergency room injury database. Begin collecting recreational boat propeller injury data, not data for all boating accidents. This data could be invaluable in better understanding accident rates and frequencies of severities. Later in this letter, we suggest a way this program might be funded.

5. **Webcast USCG / ABYC Propeller & Carbon Monoxide Injury Avoidance Meetings** - so we and other propeller safety advocates could watch live and delayed video recordings of the meetings. The safety information would be much more widely disseminated. Small firms working on propeller safety devices could all cluster around a monitor and feel like they were there. While the ability to interact live would be nice, just a fixed feed would be a great step and very economical to do. We suggest the same approach also be considered for NBSAC meetings.

6. **Propeller Safety Consortium** - we first proposed this idea back in 2002. Marine drive manufacturers could fund and cooperate in a propeller safety clearinghouse. They could gather more complete accident data, create standardized tests, cooperate on new product development, and shared propeller safety issues. Details are available at:

<http://www.propellersafety.com/propeller-safety-consortium/>

At this time, the industry already cooperates on the legal front. Marine drive manufacturers cooperate on propeller injury cases. They also develop legal defenses through the Boating Industry Risk Management Council (BIRMC). We recommend the industry focus their cooperative efforts less on the legal front and more on solving the problem.

7. **Annual Propeller Accident Statistics Press Release** - to clearly define the number of propeller injuries and fatalities for the previous year. Even though the statistics are in USCG's annual Boating Statistics report and some efforts have been made to clarify them, many people and the media still misread them. We suggest a one or two paragraph press release be made each year detailing the annual number of propeller injuries and fatalities for the previous year and that it be released at the same time as the annual boating statistics report.

When we see the media reporting the wrong propeller accident data counts we approach them and try to get them to print a correction. Many do not believe us and stick to the old Event 1 only numbers. A press release, even just a web only press release posted on the USCG boating site would be a great tool for convincing journalists of their error or possibly preventing it in the first place.

As an alternative, we suggest teaming up with some college journalism and/or safety students as a class project and have them redesign the annual boating statistics report. The goal would be to design the report in a manner that prevent the misreading errors from happening in the first place, while still maintaining the ability to compare data to previous reports.

**8. ANSI Z535 Propeller Safety Warnings / Decals / Placards** - at the helm and stern. The boating industry constantly resists the use of propeller guards claiming there are no proper standards for them. But they continue to resist introducing ANSI Z535 warnings / decals that better warn boaters of the hazards / dangers of propellers when American National Standards Institute (ANSI) warning standards have existed for many years. Its the classic case of wanting to have your cake and eat it too.

**9. Propeller Fatality Tax** - tax levied upon boat and / or drive manufacturers based upon the number of people killed by their drives or propellers each year, similar to Pollution Taxes. We have been working on a suggested format using Propeller Fatality Permits similar to Emission Permits that encourage maximum participation in reducing propeller fatalities. The program works by addressing each manufacturer's legacy drives as well as current production drives, some manufacturers having a much larger population of drives in the field than others, drives built by companies no longer in business, and non-hardware based propeller safety initiatives. We will post it on PropellerSafety.com when it is completed.

Revenue generated by the Propeller Fatality Tax could be used to fund:

- A. Propeller safety promotion (PSAs, traveling demonstrations, banners, etc.)
- B. Developing propeller safety standards
- C. Holding propeller safety meetings
- D. Propeller safety technology prizes
- E. Sponsoring propeller safety design contests
- F. Funding laboratory research and Computational Fluid Dynamics (CFD) models into the flows, pressures, and forces involved
- G. Seed funding to those developing radically new propeller safety products
- H. An immediate payment of "x" dollars to the surviving family of fatal propeller strikes to help with the expenses surrounding their death
- I. An immediate payment of "x" dollars to the family of severely struck propeller victims to deal with the immediate cost of food, lodging, transportation, child care, rent, mortgage expenses, car payments, and others as the family rallies around the victim
- J. Fund the collection of NEISS data on boat propeller injury victims (a database of accident victims at a sample of hospital emergency rooms)

**10. Court Room Holiday** - similar to a tax penalty holiday or a library book fine holiday used to quickly change behavior. The industry currently stonewalls propeller safety innovations. They do that in part because if they ever embraced them, they would be seen as liable for not using them earlier and for not retrofitting them. We propose a Court Room Holiday date be set about 18 months in the future. If the industry openly embraces propeller safety solutions by that date, they would not be punished for their new position in court cases involving older boats and drives. That could be accomplished by making the fact they now use propeller safety devices not admissible in court cases involving boats or drives manufactured prior to the Court Room Holiday. Old cases would continue to be tried as they now are. Similarly, the industry could not be punished in court for not retrofitting their newly adopted propeller safety solutions onto existing drives in the field.

**11. Require the Industry to Provide a Detailed List of Propeller Guard Performance Criteria** - for a typical outboard or stern drive boat. The industry keeps moving the target. In the recent Listman vs. OMC propeller injury trial, industry experts claim serious injuries (skull fractures) are possible when struck by a propeller guard at 3 mph instead of the 10 or 12 mph threshold previously claimed, plus several other new criteria. Even if they refuse to fund a technology prize, at least force them to supply a list of criteria a propeller guard would need to meet to be seriously considered by them.

**12. Boating Safety Classes** - require all boat operators to take a boating safety class and to take one again at certain intervals.

**13. Boat Operator Licensing** - require recreational boat owners to be licensed similar to automobile drivers licenses. Part of that process would involve taking a boating safety class and passing a test.

**14. Rental Boat Operator Training** - a few years back a packet was developed for use by rental boat operations in training rental boat operators. Those efforts seem to have been lost by the roadside. We suggest more attention be focused on training rental boat operators, especially those renting pontoon boats and houseboats.

**15. Operation Dry Water** - beef up programs similar to Operation Dry Water to help reduce the number of boater operators on the water under the influence of alcohol (BUI).

Reason - suggest programs to stimulate development of even better propeller safety programs and devices.

**PGIC Comment 19** - *IV.C Specific Information Sought. Item 20.*

Economic impact on a substantial number of small entities?

See **PGIC Comment 9**. Do not allow USCG to be misled by SBA again.

Reason - prevent USCG from being misled again.

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