



NOAA FISHERIES SERVICE



NOAA Fisheries Service is an agency within the Commerce Department's National Oceanic and Atmospheric Administration (NOAA). NOAA's mission is to understand and predict changes in the earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social and environmental needs. The NOAA Fisheries Service provides world class science and stewardship.

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New Method Improves Catch Estimates

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WHAT IS NOAA'S NEW METHOD AND WHY WAS IT DEVELOPED?

The Marine Recreational Information Program, or MRIP, is the new way NOAA Fisheries is collecting, analyzing and reporting recreational fishing data. The program brings scientists and stakeholders together to evaluate the way we've done things in the past and constantly work toward ever more reliable and trusted data. In January of 2011, the MRIP team finalized an ambitious overhaul of the way NOAA calculates recreational catch: We have corrected assumptions about how different factors might affect catch rates, and developed a new method to produce more accurate estimates. This method is being used to recalculate previous estimates dating back to 2004, and will be the basis for all new estimates moving forward. Later this year, pre-2004 estimates will also be recalculated.

"Identifying and eliminating the sources of bias is a fundamental requirement for the provision of reliable estimates."

National Research Council
Review of MRFSS

In implementing this fundamental change, we have built the scientific and statistical foundation necessary to make other significant improvements – like enhanced angler surveys, more precise estimates, and more frequent reporting – to meet the needs of fishermen, stock assessors, managers, and others.

We've also acted on a major recommendation by the National Research Council – the nation's premier independent evaluator of scientific practices – from its review of the Marine Recreational Fishing Statistical Survey (MRFSS). Congress called upon NOAA to address this and other NRC findings in the 2007 Magnuson-Stevens Reauthorization Act.

WHAT'S THE DIFFERENCE BETWEEN THE OLD AND NEW NUMBERS?

There are no across-the-board trends either in size or direction of change in the MRIP estimates. On a species-by-species basis, some estimates go up, some go down, and some remain about the same. (Visit www.CountMyFish.noaa.gov for estimation and comparison tools). However, in all cases, the **numbers are more accurate**. That's because we are now taking into consideration things like possible differences in catch rates at high-activity and low-activity fishing sites, or the amount of fishing occurring at different parts of the day. In statistics, variables like these are called **potential biases**, and can skew the actual numbers if they're not fully accounted for.

WHAT'S THE IMPACT ON THE ESTIMATES?

Each estimate is made up of two parts: The **point estimate** and the **percent standard error (PSE)**. The point estimate is the estimated number of fish caught at a given place over a specified period of time. MRIP point estimates will generally be different than those previously reported. However, because we removed numerous sources of potential bias from each estimate, and those sources can each have a different effect, there are no general trends to those changes. It's similar to when a teacher decides to score a test on a "curve"; any given final score may, or may not, be affected, depending on what all the other scores are. *Case studies are included on pages 2 and 3.*

The PSE is similar to the "margin of error" that is frequently used in public opinion surveys. It is the measure of how **precise** an estimate is. The lower the PSE, the greater the precision. The MRIP PSEs are higher than those calculated previously. But according to our analysis, that's primarily because the old PSEs were incorrect. Accurately calculating PSEs is important because a full understanding of what we don't know – and how we can better fill gaps in our knowledge – is an essential component in making prudent, sustainable fisheries management decisions.

Case Studies

In reviewing the differences between MRIP and MRFSS point estimates, no across-the-board trends emerge in the size or direction of the changes. Some numbers go up, some go down, and some remain about the same. This is due to the fact that we corrected different sets of assumptions, and each correction can have a different impact on the size or direction of change on the total catch estimates. The case studies below are meant to demonstrate the interplay among these factors in specific instances where changes occurred. ***They are not meant to be representative of the overall re-estimation results,*** which vary species by species. For a more complete analysis, visit www.CountMyFish.noaa.gov.

Case Study 1 North Atlantic Cod

Correcting assumptions about catch rates

The change

According to original MRFSS estimates, there was a *dramatic increase* – some 3.5 million fish – in Massachusetts cod catch in 2010. According to the more accurate MRIP numbers, though, the *actual difference* was far less pronounced.

Finding and fixing the bias

In our review of the data, we found the main driver of the higher estimates was *higher average catch rates* for cod at *high-activity sites*.

Historically, we have conducted more sampling at high-activity than low-activity sites as an efficient way to gather more data. When we built estimates based on that information, we assumed that average catch rates would be the same at both types of sites.

Making this assumption introduced the **potential for bias** in the average catch rate estimation. In reality the sampled angler catch rates were *higher* at high-activity sites, causing our estimates to be biased high.

By downweighting the data from high-activity sites, we've accounted for the oversampling and removed this bias.

The bottom line



The improved MRIP estimates are more accurate because our new methodology reflects the reality that catch rates differ at high-activity and low-activity sites.

Key Terms

Potential for Bias: The result of untested assumptions or unconsidered factors in a survey design that increase the chances that the survey results may be skewed higher or lower than the true value.

Weighting: The standard statistical method of ensuring that the survey results accurately reflect an entire population by correcting for over- or undersampling.

Fishing Site: The location such as a pier, dock, section of beach or boat ramp where a fishing trip ends and an angler intercept survey is conducted; sites are categorized as *high-activity* or *low-activity* based on the amount of fishing or trip returns that occur.

Catch Rate: The average number of fish caught per angler fishing trip. This includes fish that were landed, as well as those released.

Fishing Mode: The particular way an angler fishes. Anglers fishing from charter boats, private boats, or from the shore are considered to be fishing in different modes.

Case Study 2 Mid Atlantic Striped Bass

Addressing inter-related sources of bias

The change

Revised MRIP estimates of 2004-2010 striped bass landings in New York were *consistently higher* than the original MRFSS estimates by a total of nearly 335,000 fish.

Finding and fixing the bias

In this case, the differences between the MRFSS and MRIP estimates were due to an interplay among different estimation biases in three modes of fishing: private boat, charter boat, and shore fishing.

Private boat

As with Case Study 1, high-activity sites were more heavily sampled, though in this case average angler catch rates were *lower* at these sites.

Charter boat

Because of our intentional focus on high-activity sites, we *undercounted* the total number of charter boat trips from low-activity sites.

Shore mode

As with the private boat mode, angler trips sampled at *low-activity sites* showed *higher* average catch rates than those at low-activity sites, skewing the overall estimate.

The bottom line



In a complex, multi-mode fishery like New York striped bass, multiple sources of potential bias must be addressed to produce an accurate overall estimate of the total catch.

Case Study 3

South Atlantic Black Sea Bass

Properly accounting for zero-catch trips

The change

2004-2010 estimates for black sea bass catch in South Carolina were about 1.4 million fish *lower* using the improved MRIP estimation methodology as opposed to MRFSS.


Finding and fixing the bias

When we analyzed the difference between the two estimates, we found that the changes were again due to the oversampling of angler fishing trips at high-activity sites. In this case, the oversampling led to an effective undercount of “zero-catch” trips for black sea bass.

That’s because trips sampled at high-activity sites showed a higher probability of catching black sea bass. Trips with no catch of black sea bass were more common at low-activity sites.

Since we sampled more heavily at high-activity sites, this caused the MRFSS estimator of average angler catch of this species to be biased high. In reality, there were more trips that did not catch black sea bass than the MRFSS estimates showed.

The bottom line

 To produce accurate estimates, once again it was necessary to down-weight the catch data collected at high-activity sites.

Case Study 4

Gulf of Mexico Red Snapper

Addressing higher catch rates at low-activity sites

The change

According to the revised MRIP estimates, there were nearly 3 million *more* red snapper caught on the West Coast of Florida between 2004 and 2010 than previously reported under MRFSS.


Finding and fixing the bias

As in other case studies, the difference between the two estimates resulted from the MRFSS assumption that angler catch rates at high-activity and low-activity sites would be the same.


In Western Florida, we conducted more angler surveys at high-activity sites than we did at low-activity sites. Although this allowed us to gather more fishing data because we were able to talk to more fishermen, we did not account for the fact that catch rates may be different between high-activity and low-activity sites.


In this case, the reality was that angler catch rates were lower on average at high-activity sites, causing the MRFSS estimates of total catch to be biased low.


The bottom line


 There are no blanket assumptions that can be made about the relationships between the many estimation components affected by the oversampling of high-activity sites.

Key Takeaways

 **MRIP estimates are more accurate**, even if some are similar to the original MRFSS numbers. That’s because untested assumptions – or potential sources of bias – from the original estimates have been removed through a rigorous, peer-reviewed, scientifically sound process.

 **Each estimate of total catch is impacted by multiple potential sources of bias.** Removing bias therefore creates no specific trends in direction or size of changes across fish species, fishing modes, or geographic regions. Some estimates go up, some go down, and some stay about the same. This is similar to when a teacher decides to score a test on a “curve”; any given final score may, or may not, be affected, depending on what all the other scores are.

 **The new estimation method fixes a fundamental issue with our estimates.** This sets the stage to invest resources in future improvements to meet customer and stakeholder needs.

 **The new estimation method is a beginning, not an end.** Over the coming months and years, MRIP will continue to evolve to address the existing and emerging issues facing our nation’s fisheries, and provide the tools necessary to manage them effectively, sustainably and for the benefit of all whose lives and livelihoods they impact.



Transition strategy

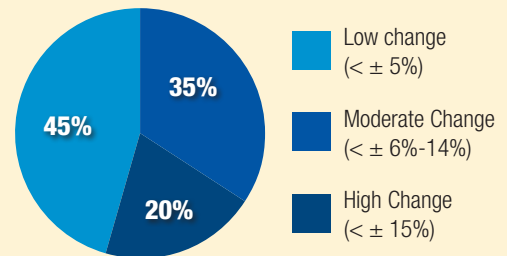
The majority of stocks managed using Annual Catch Limits will not be affected by the transition from the old MRFSS data to the improved MRIP estimates. However, the new estimates may affect the way some recreational fisheries are managed.

To ensure that NOAA Fisheries can fulfill its comprehensive mission as the steward of our nation's fisheries resources, the transition to the use of the new numbers – and the possible management implications the new estimates may bring – is taking place through a transparent, coordinated, collaborative partnership among departments within NOAA; our state, council and commission management partners; and the recreational fishing community and other stakeholders.

Most Estimates Don't Change Substantially





Although differences vary on a species-by-species basis, NOAA found that a majority of the estimates using the improved MRIP method do not change substantially from previous estimates. *(NOTE: These are coastwide averages and are based on species, not stocks. Trends vary based on geographic scale.)*

Coastwide Percent Differences



What's Next

The current re-estimation covers the years 2004-2011. As of 2013, all new estimates will be based on the MRIP method. Later this year, estimates for years prior to 2004 will be completed, quality-tested and released. Revised data will be incorporated into recreational fisheries science and management through the following process:

-  NOAA Fisheries will coordinate with the Councils and Commissions to review all available information.
-  After a thorough review of the data, we will begin discussions with Councils and Commissions on reviewing the stock assessment schedule (which is usually set two years in advance), to understand if any changes are needed for those stocks most affected by the transition to MRIP.
-  Working with our management partners and stakeholders, we will host a Calibration Workshop to develop a scientifically rigorous process for incorporating MRIP-based estimates into stock assessments.
-  Based on those findings, the Councils and Commissions can begin reviewing their management measures and, if necessary, making changes through regulatory or plan amendments.

Stay informed. Visit www.CountMyFish.noaa.gov for details and updates.

