

Flats Fishing Catch and Release Mortality: Turneffe Atoll, Belize

Background:

Catch and release refers to the concept of catching and then immediately releasing a fish back to their natural environment. This concept dates back several centuries to early trout fishermen in England who developed this practice to maintain fish populations in their prized, local streams. Fishing legends and authors, Zane Grey and Lee Wulff, popularized the concept in the United States in the middle part of the 20th century (4).

Fisheries managers have embraced catch and release as an important and effective fisheries management tool throughout the world; and, over recent decades it has become an important conservation and environmental protection mechanism creating global sustainable economic development opportunities. In 2009, Belize enacted landmark sport fishing legislation becoming the first country in the World to mandate that all bonefish, tarpon and permit be released.

Belize is known throughout the sport fishing world for its exceptional opportunities for the Grand Slam of flats fishing – a bonefish, permit and tarpon landed in one day. In 2007, Fedler, et al, determined that 92% of all sports fishers in Belize target these three species.

Sport fishing is an important sector of Belize's sustainable tourism economy with catch and release played a central role. Fedler, et al determined that sport fishing supports 1800 full time jobs in Belize and generates \$56 million (BZD) annually for the Belizean economy. This study was updated in 2013 revealing that catch and release flats fishing in Belize generates **\$112 million BZD annual** for Belize's economy and provides more than **2100 full time jobs**. Considering the sustainable nature of Belize's sport fishing, it could easily generate \$1 Billion (BZD) for the Belizean economy over the next decade.

The impacts of catch and release fishing on fish populations have long been debated by fisheries managers and conservationists. Considerable scientific information related to catch and release fishing is available, and it is essential to recognize that catch and release mortality is directly related to the fishing methods, baits and depths analyzed.

Catch and release mortality of fish caught at significant depths, with large hooks or with swallowed live bait is very high, sometimes approaching 100%, while fish landed in shallow waters (flats) with small artificial baits or flies is extremely low. Belize's flats fishery, targeting fish in shallow flats and primarily with fly fishing equipment, is a prime example of the latter with expected low catch and release mortality rates.

Paul Riess, et al summarized 82 studies analyzing catch and release mortality related primarily to flats fishing. Post-release mortality ranged from 0.2% to 5.8% with an average post-release mortality of 2.76%. Post-release mortality varied dramatically depending upon the species targeted, fishing techniques, the bait used and how fish were handled. Location of the hook wound is the single most important factor with fish hooked in the esophagus or gills having high mortality rates and fish hooked

in the lip or jaw having very low mortality rates. It is, therefore, essential to evaluate individual fisheries based upon the tackle and techniques used in that fishery.

The preponderance of sport fishing in Belize is done by fly fishers using small artificial baits in active motion. Anglers are encouraged to “pinch the barb” on hooks to further minimize impacts and most do. Anglers are also encouraged to land their fish quickly and handle them as little as possible before releasing them as quickly as possible. These fishing techniques generally lead to fish being hooked in the lip or jaw with resultant low mortalities.

Turneffe Atoll Catch and Release Analysis

This analysis focuses on the sport fishing techniques and tackle widely utilized in Belize. It first looks at detailed data from well-known angler and author, Craig Mathews. Craig collected catch and release data on bonefish over a 12-year period at Turneffe Atoll.

Craig Mathew’s Catch and Release Bonefish Data (Turneffe Atoll): 1993 – 2010

Year	Fish Landed	Successfully Released	Unsuccessfully Released	Notes
1993 (20 days)	115	113	2	Both taken by barracudas
1994 (20 days)	118	116	2	Both taken by barracudas
1995 (16 days)	120	120	0	
1996 (20 days)	174	174	0	
1997 (19 days)	209	209	0	
1998 (28 days)	341	341	0	
1999 (12 days)	102	102	0	
2000 (6 days)	60	60	0	
2002 (13 days)	62	62	0	
2003 (9 days)	43	43	0	
2009 (6 days)	45	45	0	

2010 (4 days)	26	26	0	
TOTALS	1415	1411	4	

Percent Mortality 0.28 %

The majority of fishing guides who regularly fish Turneffe Atoll were surveyed. These guides were asked to recall the number of each species (bonefish, permit and tarpon) they witnessed expiring after being caught and released. In 2011, 11 guides recalled a total of 22 bonefish, 2 tarpon and 1 permit succumbing after release.

The following assumptions were made for this calculation: first, we assumed an average of 35 weeks per year worked per guide and an average of 6 fish landed per day. The great majority of fish not surviving (22 of the 25) were bonefish. Two tarpon could not be revived and one permit did not survive.

Fish Landed	Successfully Released	Unsuccessfully Released	Notes
13,860	13,846	25	The majority of unsuccessful releases were related to bonefish taken by barracuda. 2 tarpon, 1 permit and 3 bonefish could not be revived.

Percentage Witnessed Mortality = 0.18%

Results:

Craig Mathew's recorded 1415 bonefish caught over 12 years with 4 dying after being released due to barracuda attacks, presumably facilitated by these bonefish being temporarily weakened. This post-release mortality rate of 0.28% reflects more than 90% of sport fishing species sought in Belize and also represents the techniques and tackle utilized in Belize's sport fishing (flats fishing) industry.

Sport fishing guides who regularly fish Turneffe Atoll were interviewed and asked to recall the number of bonefish, permit and tarpon that they witnessed not surviving after being released in 2011. They noted 0.18% of released fish not surviving which correlates with Mr. Mathews findings.

Conclusion:

To be relevant, an analysis of catch and release sport fishing must accurately reflect the species targeted and the techniques utilized in that fishery. This analysis relates directly to the fish targeted by 92% of anglers in Belize and reflects the fishing tackle and techniques widely used.

Our analysis concludes that the mortality rate for catch and release flats fishing in Belize is very low, and correlates with the low end of the studies reviewed by Reiss et al. This supports the widely held view that catch and release flats fishing is an environmentally and economically sustainable, as well as a key part of Belize tourism economy.

Catch and release sport fishing has been the standard practice at Turneffe Atoll for four decades. Over this period, the health of Turneffe's sport fishery has not only been sustained, it has improved. Sport fish stocks have increased as has average fish size. This would appear to substantiate that catch and release flats fishing in Belize has successfully established its sustainability.

References:

1. Dr. Anthony Fedler, Economic Impact of Recreational Fishing for Bonefish, Permit and Tarpon in Belize for 2007.
2. Records obtained from Craig Mathew.
3. Government of Belize: Statutory Instrument No. 114 of 2009, Fisheries (Species Designation and Protection Regulations, 2009
4. P. Reiss, M. Reiss, J. Reiss, Phd, J. Reiss, BS: Catch and Release Fishing Effectiveness and Mortality. [<http://www.acuteangling.com/Reference/C&RObserve.html#moreinfo>] Accessed on March 4, 2012.
5. Paul Reiss, Observations on the Effects of Catch and Release.