

The “Science” of Catch and Release angling – how can it help us improve our sport?



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Contents:



- Why should we practice C&R angling?
- What factors influence survival?
- How can we improve fish survival?

Why do we practice catch and release angling?



Conveying Mr. Henry Dreyer's 110 lb. Red Steenbras to camp at Rooi Els

Has anyone ever caught a red steenbras from the shore?



Mr. Henry Dreyer's catches at Witsands



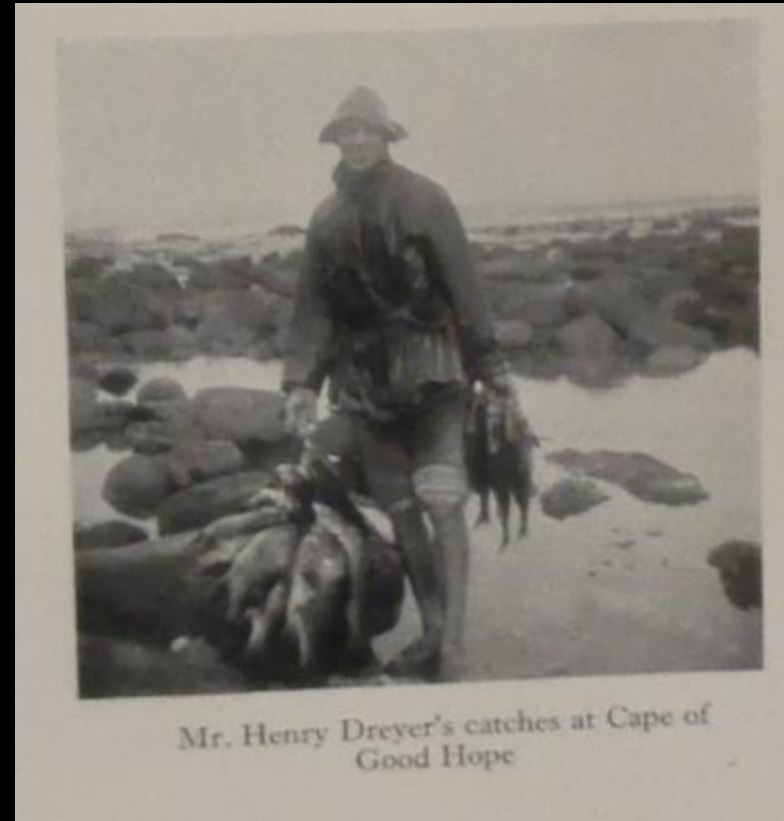
Mr. Henry Dreyer's catches at Cape of Good Hope

Has anyone ever caught 44 galjoen in a morning?

So what happened to our fish?



- Lets take the galjoen as an example.....
- Based on what we know about the biology of this fish, the average age of those 42 individuals caught by Henry Dreyer was 15.
- So, in one mornings fishing one fishermen removed 660 years worth of fish growth from the sea.



Mr. Henry Dreyer's catches at Cape of Good Hope

Most fish populations have declined but is that true?



Commercial fisheries do not target or catch our species



- There are 29 inshore hake trawlers fishing in SA
- They fish on average for 180 days a year
- They catch a total of 2390 t per year
- (Powers et al 2004)

- There are approximately 850 000 rock and surf fishers in SA (Leibolt 2008)
- If we each fish on average five times per year and catch 1kg of fish per trip our total catch would be 4250 t per year
- There are approximately 1735 light tackle boat fishers in SA (Leibolt 2008)
- Average daily catch is approximately 3.5 kg per day is 35 t per year

Cooke and Cowx (2004) –Recreational anglers catch an estimated 47.1 billion fish annually.

The difference between commercial and recreational fishers is.....



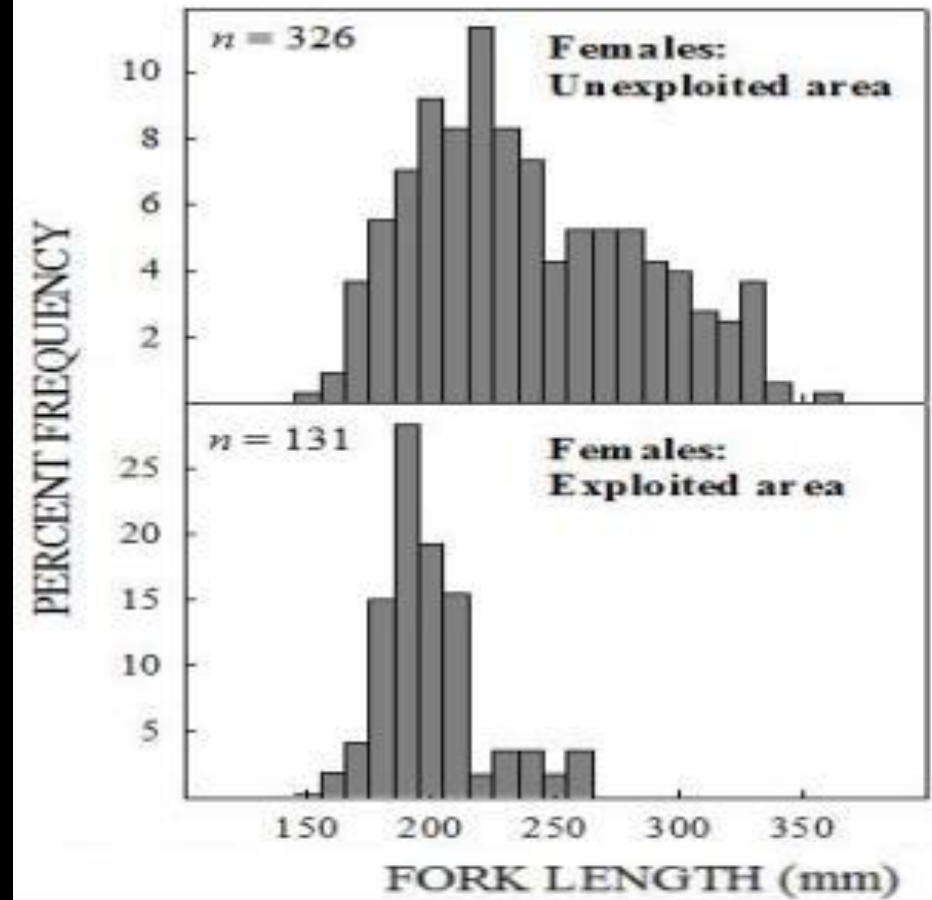
- Commercial fisher stop fishing when it is no longer economically profitable to do so (Arlinghaus et al 2007).
- Recreational anglers are not dependent on high catch rates.
- The old adage “Even the worst day of fishing is better than the best day at work” actually holds true.
- We often fish for the experience and while catching improves our satisfaction it is not the only important thing. (Arlinghaus and Mehner 2005, Arlinghaus, 2006)
- Unfortunately, this means that we place pressure on our fish stocks even if their numbers are very low. This does not happen in commercial fisheries.

WE DON'T STOP FISHING IF THE FISH POPULATIONS ARE IN TROUBLE

It doesn't matter if you are a recreational or a commercial fishermen, you still have the same type impact on the resource.

- Both reduce the mass of fish available to catch
- Larger fish are normally the first to be caught and killed
- Fish that grow the fastest are removed from the population and don't breed
- Both pollute the environment
- Both destroy habitat

(Cooke and Cowx, 2006).





**CATCHES
COMMERCIAL
FISHERY THAT
DOES NOT
TARGET OUR
SPECIES**

**We have to take
responsibility for
protecting our
fish**



is the obvious way to go. Common sense would suggest that C&R encourages the biological, economic, and social sustainability of recreational fishing, and much evidence shows that it does (Policansky, 2002).



Catch and release is only worth doing if the fish survives.



- Several studies suggest that survival varies depending on the species and on the type of fishery.
- A review of the studies by Munsiek (2004) suggested that survival after C&R ranged between 25% and 98%.
- The goal of every angler should be to get survival well over 90%



Angling activity	Potential problem	Possible result	Extreme case
Fish hooked	Tissue damage	Injury ➤	Death
Fish fought	Exhaustion	Injury ➤	Death
		Stress ➤	Death
Fish handling	Air exposure	Hypoxia ➤	Death
	Scale removal	Disease ➤	Death
	Slime removal	Fungus ➤	Death
Hook removal	Tissue damage	Injury ➤	Death
Fish released	Tissue damage	Injury ➤	Death
	Predation	Injury ➤	Death



AVOID THIS SITUATION

- Injury
- Disease/fungus
- Sublethal stress
- Fitness impact
- Mortality

CUMULATIVE IMPACT



TARGET FOR CATCH AND RELEASE

- Recovery
- No fitness effects
- No disease
- Minimal injury
- Minimal sublethal stress
- Survival

Angling activity	Potential problem	Possible result
Fish hooked	Tissue damage	Injury Death

Where the fish is hooked is generally the most important factor influencing fish survival (Bartholomew and Bohnsack 2005)

Study on the survival of dusky kob (*Argyrosomus japonicus*)



- Very few kob died when they were mouth hooked
- 73% of kob died when they swallowed the hook and the angler removed it.
- Only 16% died when they swallowed it and the angler cut the line 5cm from the hook.
- Many of these fish got rid of the hooks within 5 days.

(BUTCHER et al 2007)

ANGLERS SHOULD CUT THE LINE (5CM AWAY FROM THE HOOK) WHEN FISH SWALLOW THE HOOK TO OPTIMISE THEIR SURVIVAL.

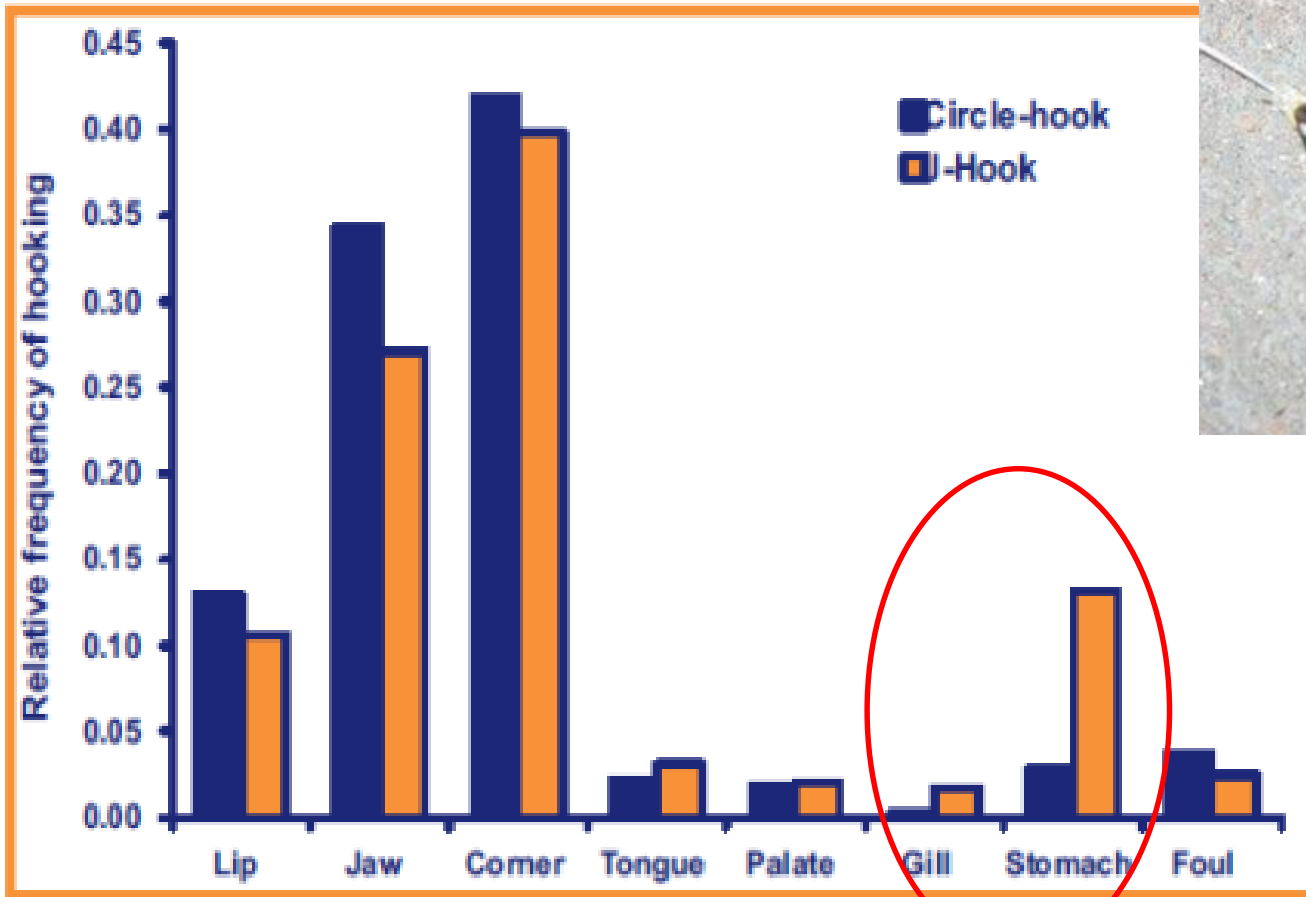
So, what factors influence the amount of tissue damage caused by hooks?

- Hook type
- Hook barbs
- Hook composition
- Hook size



Hook types – Circle vs J hook?

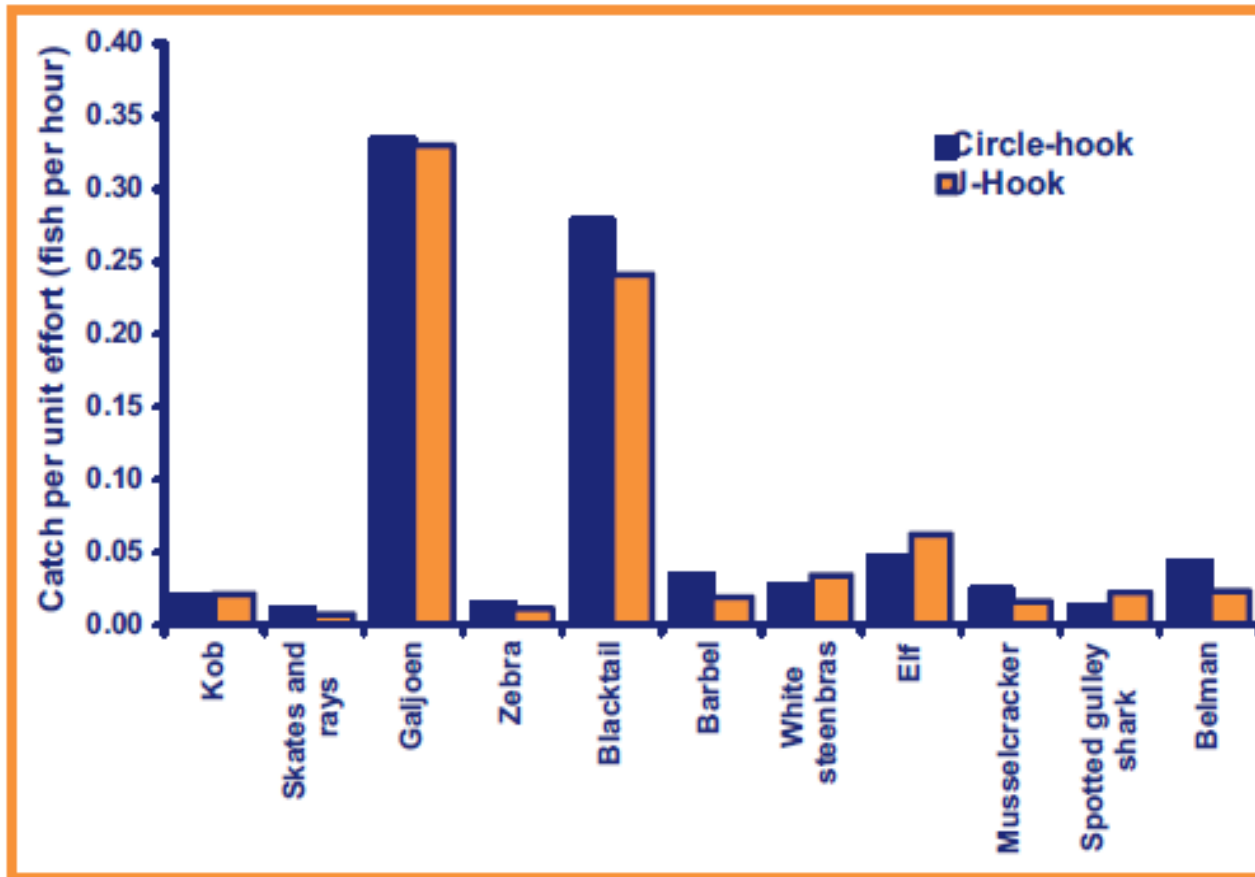
Attwood 2007 – De Hoop marine protected area



A comparison of the frequency of hooking in each position between circle-hooks and J-hooks for all species caught from the shore.

Hook types – Circle vs J hook?

Attwood 2007 – De Hoop marine protected area



A comparison of the catch rate of circle-hooks and J-hooks for common species taken from the shore. None of the differences were statistically significant, implying no difference in the catch efficiency of the designs.

The average number of sinkers lost per day by anglers fishing in the TNP tagging program dropped from 12 to 4 when they switched to circle hooks

Tying versus Snelling Fish Hooks

- Commercial fishers in NZ use a type of circle hook (Tainawa pattern, Jap Hook) and snell their hooks to the fishing line.
- Most recreational fishers tie a knot to the eye of the hook as shown in the diagram on the right.
- **Snelling improved** the observed catch rate on circle hooks **by a staggering 30%** while gut hooking of the catch was about the same



Single vs treble hooks?

Ayvazian et al. (2002)

- Shad (*Pomatomus saltatrix*)
- Treble hooks produce significantly higher mortality rate than single barbed and barbless hooks.



Barbed vs barbless

- Study on Bonefish (*Albula vulpes*) - Barbless hooks were expelled 3.9 times faster when located deep in the oral cavity compared to barbed hooks, but there was no difference in expulsion rates among barbed and barbless hooks in shallow-hooked fish (Stein et al 2012).
- The barb also increases the size of the wound and makes the fish more difficult to unhook.
- Unhooking time is significantly shorter when there is no barb (Schaeffer and Hoffman, 2002, Alos et al 2008).
- Unfortunately some studies found that fishermen using barbless J hooks caught significantly less fish than barbed hooks (Alos et al 2008), but other studies show that squashing the barb makes no difference to your catch rate (DuBois and Dubielzig 2004)



Hook chemical composition

Research into this aspect is still new.

However an Australian study (McGrath et al 2011) compared the hook ejection rates of fish that swallowed stainless steel and nickel-plated and red-lacquer carbon steel hooks in dusky kob (*Argyrosomus japonicus*)

Nickel-plated swallowed hooks corroded the fastest and were ejected quickly. Unfortunately, the nickel got into the fish's blood and killed them.



Hooks that corrode quicker are better for survival

Hooks with high nickel content are not good for fish survival

Hook size

More fish swallow the hook when you use small hook sizes (Alos et al 2008).

This will result in more fish dying.

Try to match your hook size to your target species

Minimum hook sizes:

R&S = 2/0

Estuaries = 1/0



Angling activity	Potential problem	Possible result	Extreme case
Fish fought	Exhaustion	Injury ➤ Stress ➤	Death Death

- Length of fight
- Injury during fight or while landing fish



Length of fight

- The longer the fish is played the more physiological disturbance it experiences and the longer it will take to recover

- Fighting fish for long periods reduces their energy stores and creates lactic acid build-up in their muscles
- High water temperature is correlated with increased physiological disturbances and increased probability of post-release mortality (Muoneke 1992) .

FIGHT TIME IS A FINE LINE – YOU SHOULD TRY TO REDUCE THE FISH PLAYING TIME, BUT BRINGING A GREEN FISH ONTO THE SHORE IS ALSO NOT A GOOD IDEA. Fish that jump around frantically are more likely to get injured. I would recommend that your fish should be quite tired, but not exhausted.

Injury during fight or while landing fish

Fish are often injured as we drag them over rocks or over dry sand.

Before you start fishing ask yourself :

“Can I get the fish out here without dragging over something that will hurt it?”

How can I stop the fish from ending up in the dry sand?

If I hook a big cracker where could I land it safely?



Angling activity	Potential problem	Possible result	Extreme case
Fish handling	Air exposure	Hypoxia ➤	Death



AIR EXPOSURE is in my opinion one of the biggest problems in catch and release

Rainbow trout – Fish were chase around in a tank for 30s to simulate the fight.
 Some fish were exposed to air for 30s – 38% died
 Others were exposed to air for 60s – 72% died (Ferguson and Tufts, 1992).

Rockbass - Fish that were in air for 30 s required 2 h for full cardiac recovery
 Fish that were in air for 180 required 4 h to fully recover (Cooke et al 2001).

Different fish species will vary in their sensitivity to air exposure. Eg Galjoen and Yellowbellies are quite tough. Most fish will be sensitive when the sea is warm.

However we should all try to reduce air exposure when handling fish that are to be released.

How to reduce air exposure?



Social fishing

1. Be organised!!!!
2. Know where and how you are going to land a fish that you hook
3. Land the fish in a nice calm rock pool (don't drag it over the rocks or sand, rather pick it up with wet hands) or place it or its head into the bucket.
4. Get your pliers, camera (they should be in the top of your bag) and friend to take the photo
5. Unhook the fish in the water (I often use a wet cloth to handle the fish), take it out quickly for a photo (submerge it between photos)
6. Carry it back in the bucket or quickly with wet hands (or preferably a wet cloth) and release it.

Angling activity	Potential problem	Possible result	Extreme case
	Scale removal	Disease ➔	Death
	Slime removal	Fungus ➔	Death



This often happens when you drag the fish up into the dry sand or if you touch it with dry hands.

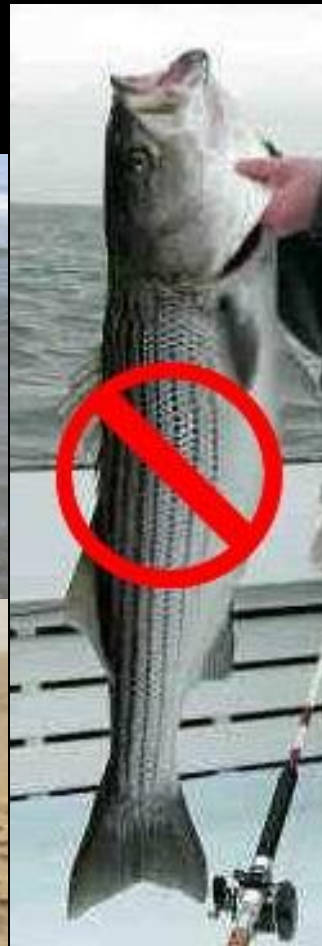
It will lead to disease and fungus and could lead to death



Angling activity	Potential problem	Possible result	Extreme case
Fish released	Tissue damage Predation	Injury ➔ Injury ➔	Death Death



Holding fish (for photos)



QUESTIONS