

## Survival of Released Reef Fish--

### A Summary of Available Data

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Following is a summary of the data available on survival of released reef fish as of June 1, 1991. Four data reports and two studies in progress are mentioned. Discussed are (1) surface releases, (2) releases into pressurized containers at the surface, (3) releases in cages suspended from the surface to 50m., (4) predation studies, and (5) autopsies of embolized fish.

#### Surface Releases

Most reef fish caught by hook and line (19 species) with manual and electric reels and by traps (79 species) from depths of 18 to 82m swam toward the bottom when released at the surface (Table 1). All of 30 red snapper (< 400mm TL) caught by hook and line with manual reels off the Texas coast from a depth of 30m quickly swam down after being released at the surface (Parker 1985, Progress report). In another study of red snapper (< 300mm TL) caught from depths of 21-24m (n=138), 30m (n=27), and 37-40m (n=47) off Texas and released at the surface, survival was 99%, 89%, and 64%, respectively (Gitschlag and Renaud, In press). Fifteen (71%) of 21 red grouper (< 508mm TL) caught by hook and line from a depth of 44m off Florida's west coast, survived recompression to that depth for 24 hrs in individual recompression chambers (N. Wilson,

Univ. of S. Florida, Personal communication). Eighty-three percent of 305 fish of eight species caught by hook and line with manual and electric reels off South Carolina from depths of 21 to 52m swam away when released at the surface (Collins 1988, Cruise report). In a 1990 study off South Carolina, 85% of 9 species (n=194) caught by hook and line from a depth of 37m swam down after release, and 84% of 11 species (n=109) caught by hook and line from a depth of 46m swam down after release (Collins 1990, Cruise report). Of fish caught by hook and line off South Carolina from depths of 30m, 37m, and 46m and held in a tank 1m deep, 99% (n=113, 7 species), 92% (n=222, 12 species), and 80% (n=202, 14 species) swam down, respectively (Collins 1990, Cruise report). Finally, 78.5% of 1,884 fishes (79 species) caught in 417 wire fish-traps off the southern coast of Florida to the Dry Tortugas from depths of 31 to 82m swam down from the surface when released (Harper et al., In press).

#### Caged Fish Studies

The majority of reef fish caught by hook and line from depths of 22 to 50m, returned to capture depths, and held in cages, survived 10 to 15 days (Table 1). All mortality occurred within 48 hrs of capture. In a set of experiments (14 fish in individual cages) conducted off Daytona Beach, FL in March 1983, 79% ( $0.79 \pm 0.24$  at  $\alpha = 0.05$ ) of red snapper (< 400mm TL) survived at least 10 days in cages at 22m. In another set of experiments (37 cages with 1 fish each, plus 2 cages with 2 fish each) on red snapper at 30m

off Galveston, Texas in June 1984, 89% ( $0.89 \pm 0.09$  at  $\alpha = 0.05$ ) of 44 fish survived to the end of the experiments, 12 to 13 days (Parker 1985, Progress report). In a final set of experiments with small (<300mm TL) red snapper off Galveston, Texas, 64% of 55 fish caught at a depth of 50m and returned to 35m in cages, survived 10 to 15 days to the end of observations (Gitschlag and Renaud, In press). These data indicate that survival of released reef fish is inversely related to their depth of capture.

### Predation

In situ predation studies are difficult to conduct. Finding large numbers of the species and sizes of fish at depths we are interested in, in the presence of predators and where divers can be safely suspended in the water column for observation can be a monumental task.

One such study indicated a survival rate of 81.5% (Parker 1985, Progress report). Diver observations of released hook and line caught fish in 20-30m were made during the week of August 24-28, 1981 off Daytona, Florida. Ten (18.5%) of 54 released fish (45 vermilion and 6 red snapper, 2 gray trigger fish and 1 gag) observed on their way to the bottom, were taken by predators, primarily greater amberjack and barracuda.

Parker observed three released red snapper between 2 and 25m off Galveston, Texas during June 1984. No predation was seen, but very few large predators were seen around the Tenneco Platform Galveston 393-A where the observations occurred.



Attempted observations by Parker of predation on released fish at Tenneco Platform Brazos 17 off Freeport, TX in 45m of water failed. It was virtually impossible to bring snapper to the surface without attacks from large amberjack.

### Autopsies

In the laboratory we took radiographs of reef fish taken from 30 to 100 m, conducted underwater necropsies similar to that used in cases of air embolisms in human patients, and attempted to find emboli through histological examinations. Radiographs demonstrated the presence of ruptured swim bladders and of gas in the pericardial space. Underwater necropsy revealed gas in the abdominal cavity, intestine, heart, eye, musculature, and under the skin that apparently came from ruptured swim bladders. Evidence of healed ruptured swim bladders was noted in black sea bass that survived the holding experiment. Emboli could not be determined from histological examinations. Embolisms, apparently, are not fatal in some fish as they would be in humans who become saturated with gases and then surface from depths greater than 18m.

### Summary

It would be tempting to attempt to consolidate all data into a single relationship of survival with depth. However, the variety of sites, species, depths, and circumstances precludes that effort. Overall, it appears that the best survival has been on the order of 100% with a median of 84% (Table 1). We suspect for some

species these data would overestimate mortality because the bulk of the experiments have been conducted at greater depths where mortality is most likely. In shallow water (< 20m) survival may well approach 100% for some species. On the other hand, some species (e.g. white grunt at normal capture depths of 30 - 40m off North Carolina) appear hypersensitive to barometric trauma and experiments conducted to date may underestimate mortality for those.

#### Literature Cited

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813-803-9178 MARFIN Grant.

Table 1. Survival of Surface Released and Caged Reef Fish - All Available Data (June 1991).

Species	Maximum Size (TL mm)	Number	Depth(m)	Survival(%)	Reference
<u>SURFACE RELEASED</u>					
Red Snapper	400	30	30	100	Parker
Red Snapper	300	138	21-24	99	Gitschlag
Red Snapper	300	27	30	89	Gitschlag
Red Snapper	300	47	37-40	64	Gitschlag
Red Grouper	508	21	44	71	Wilson
8 Species		305	21-52	83	Collins
9 Species		194	37	85	Collins
11 Species		109	46	84	Collins
7 Species		113	30	99	Collins
12 Species		222	37	92	Collins
14 Species		202	46	80	Collins
79 Species		1,884	31-82	78.5	Harper
<u>CAGED</u>					
Red Snapper	400	14	22	79	Parker
Red Snapper	400	44	30	89	Parker
Red Snapper	300	55	50	64	Gitschlag