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## Sea Turtles and Resistance to TEDs Among Shrimp Fishermen of the U.S. Gulf Coast

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**ABSTRACT** The National Marine Fisheries Service (NMFS) has issued regulations requiring Southeast Atlantic and Gulf Coast shrimp fishermen to use Turtle Excluder Devices (TEDs) on their nets. Significant opposition has developed among Gulf Coast shrimpers. Ethnographic data, including observations of turtle capture and mortality, suggest reasons for resistance to the regulations.

Paul Durrenberger (1988) provides an excellent description of a complex legal situation which has led to pending regulatory requirements that U.S. shrimp fishermen install TEDs (Turtle Excluder Devices) on their trawl nets.<sup>1</sup> Durrenberger notes that Gulf Coast shrimpers believe they pose no critical threat to sea turtles and are intent on resisting use of TEDs. Here I offer ethnographic details on why shrimpers hold these attitudes. Key points are that shrimpers are not antagonistic toward turtles and are being neither duplicitous, nor irrational; their reactions are basically forthright and firmly based upon experience.

### The Threat to Turtles

Shrimpers are closely attentive to the varied fauna brought in by their nets. Captains constantly evaluate the mix of species as one means of gauging whether their nets are properly "tuned" to work on the bottom without "plowing" (White 1977b:214). Thus Gulf shrimpers are well aware that they sometimes catch sea turtles. (It is in the rhetoric of confrontation that "we don't catch many turtles" becomes "we don't catch turtles.") Until recently, they did so with impunity; what to do with a turtle was strictly up to those on board the vessel.

Some shrimpers are recent recruits to the fishery, but many are from families with several generations of experience in Gulf coast fisheries. Along the eastern shore of Mobile Bay, Alabama, many people recall going down to "the front beach," on the Gulf of Mexico, to dig for turtle eggs in early summer.<sup>2</sup> Sometimes used for omelettes, the eggs were especially prized for use in cakes and puddings. Over the past three decades, though, increasingly rapid beachfront development (first cottages, then high-rise condos and hotels) has led coastal people to perceive lessened access to beaches, both for themselves and for turtles.

Alabama shrimpers interviewed in 1987-88 consistently held that (a) other causes are primarily to blame for turtle mortality (they cited beachfront development, intensive turtle eggging in Mexico and Central America, ingestion of plastic

debris, potential disruptions in the food chain, mortality caused by snapper fishermen and longliners, and pollution), (b) shrimpers catch relatively few turtles in the Gulf of Mexico and fewer or none in the bays, (c) turtles captured are usually returned to the water alive, and hence (d) using TEDs would provide little meaningful benefit to turtles.

The first of these points is not addressed here, although it might be noted that environmental organizations stress many of the same factors (among others) when not directing their comments at shrimpers (e.g., Wexler 1981, Plastic 1983, Carothers 1987, House 1987, Keller 1987). In discussion of their "final rule" requiring the use of TEDs, the National Marine Fisheries Service (NMFS) also notes such factors (*Federal Register* 52[124]:24247, June 29, 1987). The next two points, i.e., perceptions of shrimpers about capture rate and live return rate, may be addressed with data gathered in 1971-73 and 1977, before turtle capture became an issue.

Table 1 shows data from 29 trips on Gulf trawlers, with trip date (year and month), boat size and material, number of nights per trip, number of drags, and number of turtles captured. The data do not provide adequate comparison between large and small Gulf boats nor between shrimping in different areas or depths; most data are from small boats working between 10 and 30 fathoms. Fishing effort was not evenly enough distributed over time to allow meaningful comment on seasonality of turtle capture. The "bottom line" is simply that six sea turtles were captured during 195 nights at sea. In this, the data do provide a clear contrast between shrimping in the East-Central Gulf of Mexico and shrimping in the Cape Canaveral area of the Atlantic Coast; there, NMFS tests netted 42 turtles in 15 forty-five minute drags with a single TED-less "control-net", while the TED-equipped net caught none (*Federal Register* 52[192]:37153, October 5, 1987). When I mentioned this NMFS experiment to one shrimper, he exclaimed, "Damn! If I ever caught that many turtles, I'd hafta use them TED's, or something!" If capture rates in the East-Central Gulf and at Canaveral were closely similar, we would have netted nearly ten thousand turtles, rather than six.<sup>3</sup>

The reason Gulf Coast shrimpers say they do not catch (many) turtles is that, in fact, they catch very few. The capture rate varies, from year to year and place to place; one shrimper told me that he caught over a hundred turtles one year, but in other years he caught none. Even if my direct observations represent fortuitous timing or microlocations, and a capture rate only 10% of 'normal', the capture rate would still be only 0.6% of that suggested by NMFS for the Canaveral area.

Turning to mortality, shrimpers raise again questions. NMFS suggests an overall 23.3% mortality rate among turtles captured in shrimp trawl; if, per NMFS estimates, 47,973 turtles are captured annually, 11,179 die (*Federal Register* 52[124]:24246, June 29, 1987). Alabama shrimpers do not believe this, consistently claiming that most turtles are returned to the water alive; they also suggest that intentional butchering of turtles for food was a more substantial mortality factor in the past than accidental drowning in trawls. My observations lend some

Table 1. Frequency of Sea Turtle Captures in Shrimp Trawls (Ship Shoal, Louisiana to Cedar Key, Florida; 1971-73, 1977)

Trip#	Date	Boat/size/mat.	#Nights	#Drags	#Turtles
01	7107	"A" 43' wood	6	19	0
02	7108	"	4	10	0
03	7108	"B" 51' wood	7	25	0
04	7108	"	1	20	1
05	7201	"C" 76' steel	1	1	0
06	7207	"D" 85' steel	11	35	0
07	7207	"E" 57' wood	9	23	0
08	7208	"	13	32	0
09	7208	"	5	18	0
10	7209	"	7	20	0
11	7210	"	14	31	1
12	7211	"	9	23	0
13	7212	"	6	24	0
14	7212	"	3	9	0
15	7301	"	7	26	2
16	7301	"	2	0	0
17	7301	"F" 62' wood	5	13	0
18	7302	"	5	12	0
19	7303	"	7	16	0
20	7304	"	2	8	0
21	7304	"	5	11	0
22	7306	"E" 57' wood	11	29	1
23	7709	"	7	19	1
24	7709	"	3	9	0
25	7710	"	9	26	0
26	7710	"	13	39	0
27	7711	"G" 53' wood	2	4	0
28	7711	"	9	16	0
29	7712	"	7	22	0
Total			195	540	6

credence to both contentions, as indicated in Table 2 (this includes not only the six turtles I saw captured, but four others mentioned by personnel on other boats)

This sample of turtles caught is too small to be significant in discounting drowning; NMFS figures merely suggest that one of the six observed turtles might have been dead, and one (notably, the one caught during the longest drag) did come up stunned. Even so, reports from shrimpers suggest much lower mortalities. The man who reported catching over one hundred turtles during one year said he had caught two dead turtles in twenty years. But at the same time,

Table 2. Details of Reported and Observed Sea Turtle Captures in Shrimp Trawls (1971-73, 1977)

No.	Date	Lctn	Species	Drag Time	WDF	Cndtn	Fate
1	710820	4	Loggrhd	?	11	Alive	Released
2	710820	4	Green	?	11	Alive	Butchered
3	710821	4	Loggrhd	?	10	Alive?	Released?
4	710821	4	Loggrhd	1.8 hrs.	10	Alive	Released*
5	721016	2	Loggrhd	6.8hrs.	14	Alive	Released**
6	730113	5	?	2.5 hrs.	13	Alive	Released
7	730114	5	?	3.0 hrs.	13	Alive	Released
8	7304?	5	?	?	?	Alive	Butchered
9	730626	1	Loggrhd	4.3 hrs.	12	Alive	Butchered
10	770909	3	Hawksbl	2.5 hrs.	11	Alive	Released

## Notes

Nos. 1-3, 8: Reported by other boats.

Nos. 4-7, 9-10: Directly observed.

Date: YR-MO-DA.

Locations: (1) Lightship LA, (2) North and South Bottom LA, (3) South of Horn Island MS, (4) Mobile Bar AL, (5) Apalachicola FL.

Species: Two turtles directly observed were not identified by species as they were in the wings of the net and were released without being brought on deck.

WDF: Water Depth, Fathoms.

Fate: \* Release involved intervention; see footnote 5.

\*\* This turtle appeared dead at first but was only stunned; it revived unassisted after about half an hour on deck.

my figures suggest that roughly 15-30% of turtles may have been butchered in the 1970s and before (current practice is unclear, but I am told that butchering has ceased).

Green turtles, though seldom captured, were prized by Alabama shrimpers; they did not sell them,<sup>4</sup> but took them home or gave them to relatives or friends. Loggerheads were also valued for their tasty meat. Turtle shells were used, as flowerpots for the front yard or as home ornaments, but I know of no instance in which a turtle was killed simply for its shell.<sup>5</sup>

It is not my intention to directly challenge NMFS capture rate figures for the Southeastern U.S. as a whole, nor the mortality rates; my data are from only 6% as many observation-hours as put in by NMFS observers (*Federal Register* 52[124]:24244, June 29, 1987). NMFS recognizes the "unusually high concentrations of sea turtles at Cape Canaveral" (*Federal Register* 52[40]:6180, March 2, 1987), and TED requirements were scheduled to go into effect earlier there; it is clear that the total estimated annual turtle capture figures were not simply extrapolated from that extraordinary setting.

But even though my data do not "disprove" NMFS conclusions, it is also clear that the NMFS figures could in no wise be derived from my observations. My point is that observations noted here are probably typical of the experience of

many shrimpers who work the East-Central Gulf. Thus there should be little wonder if their view of reality scarcely resembles that seen by NMFS.

Surprisingly, shrimpers still bear little if any animosity toward turtles. In 1987-88, several voluntarily expressed beliefs that turtles "are God's creatures, too" and "have the right to live." Some indicated that they have always tried to resuscitate any turtle they didn't intend to eat; most expressed willingness to learn the NMFS techniques for resuscitation.

Shrimpers are fighting TEDs rather than turtles; a director of the Texas Shrimp Association and supporter of a Galveston turtle nursery project is quoted as stating that "everything we do for the turtle is going to be good for the shrimp, too. They both need a clean, healthy environment" (Edwards 1988b). Such attitudes could change, of course, if shrimpers find themselves economically harmed by TED regulations (Durrenberger's comments (1988) on the Iowa Cow War of 1931 are especially cogent in this regard).

### Resistance to TEDs

Some environmentalists have explained shrimpers' resistance to adoption of TEDs by resorting to stereotyped images of fishermen. For instance, an Audubon Society newsletter editorialized that "... shrimp boat captains like to fish the way their daddies fished and didn't take to the newfangled contraptions" (Wille 1987).

Such characterizations are contradicted by the history of technological development in shrimping. Before 1918, the commercial fishery was negligible, depending on cast nets and hand-hauled seines; within living memory, shrimpers have (a) adopted trawl nets and motorized vessels, (b) switched from gasoline to diesel engines, (c) expanded into the Gulf with larger vessels, (d) largely replaced lugger-rigged boat pulling single nets with "double-rigged" boats pulling two nets, and (e) adopted a wide spectrum of electronic communication and navigation gear. Within the past fifteen years, Gulf shrimpers have begun pulling two nets from each outrigger (a configuration sometimes referred to as "four-bangers"); this involved much experimentation with center "sleds," "torpedoes," and "dummy doors" as alternative devices in conjunction with the paired otter boards or "doors." Also, new net designs have been developed recently, including a "bib net" particularly effective with white shrimp.

Shrimpers constantly work with their boats, rigs, and nets, rigorously testing performance; the double-rigged configuration is ideal for measuring results of experimental modifications (i.e., only one rig is changed, and catches are then compared). It is at best silly to suggest that shrimpers are afraid of technological innovation or unable to recognize a beneficial device when they see one, and at worst it is a rationalization which attempts to excuse ignoring their opinions.

The fact that shrimpers have not widely experimented with TEDs voluntarily is best explained by the observations that they see no potential benefit worth the bother. "Cannonball shooters"<sup>6</sup> (Durrenberger 1988:200) were developed by shrimpers to deal with a problem they recognized, but the conceptually relat-

ed TEDs have been spurned. In fact, the precursor of the "soft TED" was developed in the 1950s by a South Carolina shrimper who had a significant problem with bycatches of jellyfish and stingrays (Voss 1988).

The ostensible benefit which shrimpers have been most widely expected to embrace is the decreased catch of finfish, jellyfish and "trash" with TEDs (Wille 1987, Edwards 1988a). Advocates of this view have suggested that the "TE" in TED should refer to "Trawler Efficiency" rather than "Turtle Excluder." Seen from outside, the logic is as follows: shrimpers catch large volumes of "trash" species which are unmarketable or bring such low prices compared to shrimp that processing is not economical; time spent sorting through "trash" for valuable species is a major labor activity on shrimp trawlers; hence shrimpers should welcome the reduced "labor costs." The argument rests on basic misconceptions about labor arrangements and costs on shrimp boats.

First, many Alabama and Florida trawlers include among the crew an apprentice deckhand or "fishboy" (White 1977a:163) who, like the "header" on Texas shrimp boats (Maril 1983:12), is not paid a direct share in the catch. Unlike Texas headers, who are paid on a piecework basis, fishboys are paid with "fish money" (White 1977a:225). However little economic return finfish may bring, it is usually enough to buy the labor of a young extra deckhand who assists significantly in sorting shrimp from trash.

Second, even with regular deckhands, sorting time has no direct effect on income or labor cost, and only rarely or indirectly on total catch or vessel efficiency. Captains and regular crewmen earn a percentage of "share" of the catch; quick processing means more time for relaxing or sleeping, but it does not enhance income. It would be different if deckhands were paid an hourly wage for processing; then, they would have incentives for taking longer at tasks, and boat owners would have incentives for reducing the time required. As it is, work 'slow-downs' are virtually unknown on shrimp boats. Boat owners and/or captains, like crewmen, are seriously concerned about processing time and bycatch mass only if it takes so much time as to deprive the crew of essential sleep or if bycatch damages the rigs or prevents efficient re-setting of the nets.

Thus while TEDs might make the labor process more efficient, they would not make labor less costly. Proponents of TEDs have also suggested that fuel efficiency on trawlers would be improved (Fitzgerald 1988:30), but at best this would be a 1-2% reduction in fuel use during certain limited operating circumstances. All of the "efficiency" arguments apply at best to marginal costs, while overlooking the possibility of significant catch losses.

The various arguments for increased "efficiency" with TEDs are rationally constructed, but empirically uninformed. In contrast, shrimpers know of various fishing conditions which they reasonably fear will make their rigs inoperable with TEDs. Seaweed beds of various sorts are a primary concern. For example, "sauerkraut," found near Louisiana's Chandeleur Islands and Mississippi River passes, clogs webbing and accumulates around the "choke strap" at the net's throat; it often reduces drag length from three or four hours to two, and with TEDs could block the net within minutes. Buckmaster (1988) and Edwards

(1988a) report similar problems with seaweed in the Carolinas. Other organisms such as "loggerhead sponges" (*Speciospongia vesparia*), common on winter grounds around Apalachicola, Florida, would pile up in front of a TED without being ejected because they are larger than the 25"-35" openings. Edwards (1988a) reports clogging with both sponges and starfish around Key West, Florida. Ironically, larger sea turtles could also be trapped, deflecting fish and shrimp out through the TED escape hatch while they remain pinned inside.

The bay fishery deserves separate mention, as it faces extreme problems even by NMFS reckoning. As initially proposed, the NMFS rule would have exempted from the requirement to use TEDs all nets with "a headrope length of 30 feet or less," because "TEDs are not efficient, both in terms of turtle exclusion and shrimp retention, when used on small nets" (*Federal Register* 52[40]:61871-82, March 2, 1987). As issued in final form, the rule permits no exemptions based on net size, but allows boats less than 25' long to work without TEDs so long as they make drags of 90 minutes or less (*Federal Register* 52[124]:24244-262, June 29, 1987; *National Fisherman* 1988).<sup>7</sup> This excuses only the very small "Lafitte skiff" commercial boats, and "recreational" shrimpers who fish from skiffs with outboard motors.<sup>8</sup> At least in some states, the larger commercial bay boats are left with a requirement that they either limit drag time to 90 minutes, or use a device which NMFS has stated neither excludes turtles nor catches shrimp with nets the size many of them pull (Alabama allows no more than 50' of headrope netting, and double-rigged boats use twin 25' nets).<sup>9</sup>

Any inshore boat is exempt from using TEDs if drag time is limited to 90 minutes, but bay shrimpers say this would be "impossible" given present work patterns and crew arrangements. Bay boats rarely carry more than two crewmen, and ever since the escalation of fuel prices in 1973 it has become increasingly necessary for them to work "days and nights;" the 100-hour week which was previously the extreme (White 1977b:201) had become the norm in 1987. In order to accomplish this, the captain and crewman must alternate wheelwatches with naps; to get sufficient sleep, three to five hour drags are necessary. With 90-minute tows, the shrimpers could get eight hours of sleep per day only if they consistently held deployment, retrieval, and processing time to no more than thirty minutes, and took meals separately during their respective wheelwatches. But eight one-hour naps per day over a four- or five-day period is a more strenuous routine than anything shrimpers have previously had to endure. The only solution would be a larger crew, but production is considered insufficient to support three men.

### The Management Problem

As noted by Durrenberger (1988:209), resistance to fishery regulation is exacerbated when policy objectives are peripheral to fishery issues per se, or when policy development does not take fishermen's interests into account. Both problems are evident in the case of sea turtle protection and the "solution" of TEDs. Shrimpers have not been shown (to their satisfaction) that they are a primary

threat to turtles, nor that protecting turtles will help the fishery; the trawl device being required promises no visible benefit to them, but the adverse consequences they anticipate seem all too real. The image of NMFS, not favorable to begin with, has been sullied by a widespread perception that NMFS does not understand the issue as it affects shrimpers.

NMFS experiments with TEDs have been directed toward achieving >96% reduction in turtle capture, with no criteria for acceptable extent of shrimp loss; NMFS does, however, have a "research protocol" for studying loss of shrimp (*Federal Register* 52[40]:6181, 6198-99, March 2, 1987). NMFS has claimed that TEDs are capable of "maintaining shrimp catches equal to standard rigged trawls," and formally defined a TED in 50 CFR 658.2 as "... a device ... that reduces the catch of sea turtles and finfish bycatch, while not reducing shrimp catch" (*Federal Register* 51[992]:17488-89, May 13, 1986). But elsewhere they admit that "some TEDs may reduce shrimping efficiency" (*Federal Register* 52[40]:6181, March 2, 1987). Here NMFS also speculates that certain TED designs (yet to be developed) "may improve shrimp yields." Perhaps NMFS should have said that other designs may lessen shrimp losses. Some environmentalists, of course, boldly claimed that "studies now show that the improved equipment causes no loss in shrimp yields" (Reilly 1987) or that "some TED designs actually appear to increase the shrimp catch" (Historic 1987:1). NMFS' most consistent claims of no shrimp loss apply to their own rigid-frame TED design; with the "soft TEDs," attractive to some shrimpers because they seem safer, NMFS notes shrimp losses ranging from 17% to 79.5% (*Federal Register* 53[170]:33820).

Shrimpers remain unaware of NMFS data indicating maintenance of shrimp catches with TEDs (much less, improvement). Contrarily, shrimpers who tested the devices report losses ranging from 20-50% (Howard and Brownfield 1987, Buckmaster 1988). Alabama shrimpers I talked to expected losses of 20-30%. Prevalent industry assessments are exemplified by Edwards (1988a:76): "The consensus of researchers not promoting a particular type of hard or soft TED is that all will lose a certain amount of shrimp under some of the bottom conditions encountered by shrimpers in every local area."

In spring, 1988, NMFS finally began a study of shrimp catches in TED and non-TED nets; results are expected by January of 1990 (Piatt 1988). By then, it will be too late for the information to assist shrimpers in choosing a TED design appropriate to their particular circumstances. Perhaps even worse, from a management perspective, is the fact that it will also be too late for NMFS to redeem themselves in the eyes of the shrimping industry.

### Summary and Conclusion

I have presented here some of the specific objections which shrimpers have to the TED regulations; this required outlining their criticisms of NMFS. It must be stressed that an adequate explanation of shrimpers' antagonism toward NMFS cannot be based on political attitudes. Some shrimpers could be

described as anarchists (albeit apathetic) and many express commitment to laissez faire economic policies, but this is not the crux of the matter. No matter how much negativity one hears regarding NMFS personnel or regulations, it must be understood that these expressions are situational.

Shrimpers are not opposed to any and all regulation of fishery resources. The best evidence of this is that permanent closures in some waters, and seasonal closures in others, have been an accepted part of inshore shrimping for many years. Shrimpers realize that times are changing, and that regulations must change with the times. They ask only that their interests be recognized and balanced with other interests. Also, if other interests must prevail, shrimpers will be satisfied (which is not to say pleased) only if the decision "makes sense" and is "fair." In the present instance, this would require (a) convincing them that turtles are in fact endangered, (b) presenting them with evidence that their activities are a significant threat, and (c) demonstrating that all culpable parties (whether beachfront developers, or foreign countries) are being proportionally burdened with responsibility for setting things right.<sup>10</sup>

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### Notes

1. Durrenberger's account ends in July 1988 with the Endangered Species Act (ESA) awaiting action in the House of Representatives, which had previously rejected Senator Howard Heflin's delayed enforcement amendment. Since then, both Houses of Congress passed the ESA with the Heflin amendment, and it was signed by President Reagan. Implementation was delayed by 10 months in offshore waters and 22 months in inshore waters (i.e., until May 1, 1989 and May 1, 1990, respectively) (Fee 1988:21).

2. Turtle egg-hunting time on Alabama beaches has been identified by some as the first full moon in June (Buskens 1986:184, 201).

3. Calculated from NMFS capture rate of 7.47 turtles/hour, if double-rigged; correcting for assumed 20% smaller nets on Alabama boats, 540 3-hour drags would yield 9,681 turtles.

4. There have been exceptions elsewhere along the Gulf Coast. In March, 1973, an inshore shrimper from Cedar Key, Florida, reported fishing for turtles whenever possible; he mentioned several breaks in Waccasassa Reef where he would stretch a net 100 yards wide, and told of getting 14 turtles "in one tide." Local restaurateurs also caught turtles "whenever we can" and were soliciting Texas and Apalachicola boats temporarily in Cedar Key to bring in any green turtles captured (those weighing >125 pounds). They paid \$3.85 per pound, dressed, and did not want loggerhead turtles.

5. In one instance (see Table 2), I personally intervened to secure release of a loggerhead turtle which a crewman initially wanted to take home as a curiosity and then expressed a desire to kill. Perhaps notably, he was from a non-fishing family and did not stay with shrimping; I neither observed nor heard of similar behavior among those from fishing families.

6. The name for "shooters" involves a play on words; it could as aptly be spelled "chuters."

7. The shift in focus from net size to boat size seems to reflect an enforcement consideration (it

being difficult to judge the size of a net, visually, whereas boat size is easily assessed) rather than being based on matters of effective turtle capture/exclusion.

8. In 1973, commercial bay boats in Bon Secour, Alabama, ranged from 27' to 52' in length. Now, two trends are apparent: first, toward modified Lafitte skiffs (Piatt 1989) which are less than 25' long, and second, toward larger boats (some > 60'). In most cases, even the latter continue to pull small nets.

9. The mischief (and fruitless expenditure) caused by changing from proposed regulation of net size to final regulation of boat size is suggested by what happened with Mississippi state requirements. Before TEDs, boats shrimping in Mississippi waters had never been allowed to pull double rigs, and most trawled with single 38' to 50' nets; in July 1987 Alabama shrimpers told me that Mississippi had changed their law to allow re-rigging with twin 25' nets, in anticipation of TED regulations.

10. The NMFS Office of Protected Species and Habitat Conservation conducts "Section 7" (Endangered Species Act) consultations, so the Fish and Wildlife Service (FWS) is not directly involved in NMFS policy directions. Nonetheless, it is noteworthy that parts of the shrimpers' critique (i.e., regarding the extent of turtle endangerment by shrimpers, and the question of whether regulations should apply equally to the Atlantic and the Gulf) have just been echoed in broad terms by a General Accounting Office (GAO) report requested by Representative (D-Mass.) Gerry E. Studds. According to the *Los Angeles Times* (Friday, January 20, 1989, page I-2), the GAO report criticized FWS for concentrating attention on species with high "public appeal" and for taking actions based more on expedience than effectiveness.

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