

Virgin Islands Baitfish Survey: October to December 1986

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INTRODUCTION

The importance of investigating the ecology of baitfish in tropical fisheries has slowly been recognized by the scientific community. As readily observed, the presence and movements of baitfish species have long been essential to the activity of fishermen. The number of references pertaining to the ecology and life history of tropical baitfish species in scientific literature is surprisingly meager.

Fishery scientists throughout the Caribbean have realized that the need for more information on the forage base is essential for a better understanding and adequate management of island fisheries, especially the migration of pelagic species. The pelagic fishes are dependent on the success and movements of a few important baitfish species.

The present study was initiated to yield information on the baitfish observed on the North and South sides of St. Thomas, U.S. Virgin Islands along with information on fishing success using available gear, catch composition by species and relative abundance of baitfish species. Additionally, information from local fishermen on baitfish habits and comparison of catch data was undertaken to provide an adequate and relatively unbiased preliminary data base.

METHODS

The intent of the study was to develop a fishery-independent sampling method in order to obtain preliminary data on effort per gear type, catch composition and relative abundance of baitfish species.

The location of the study was selected bays off the northern and southern shore of St. Thomas, U.S. Virgin Island (Figure 1). The bays selected were Nazareth and Benner Bays on the southeastern side of St. Thomas and Hull Bay on the northwestern side. Additionally, observations were made around St. James Islands off the southeastern shore and Brass Islands off the northwestern

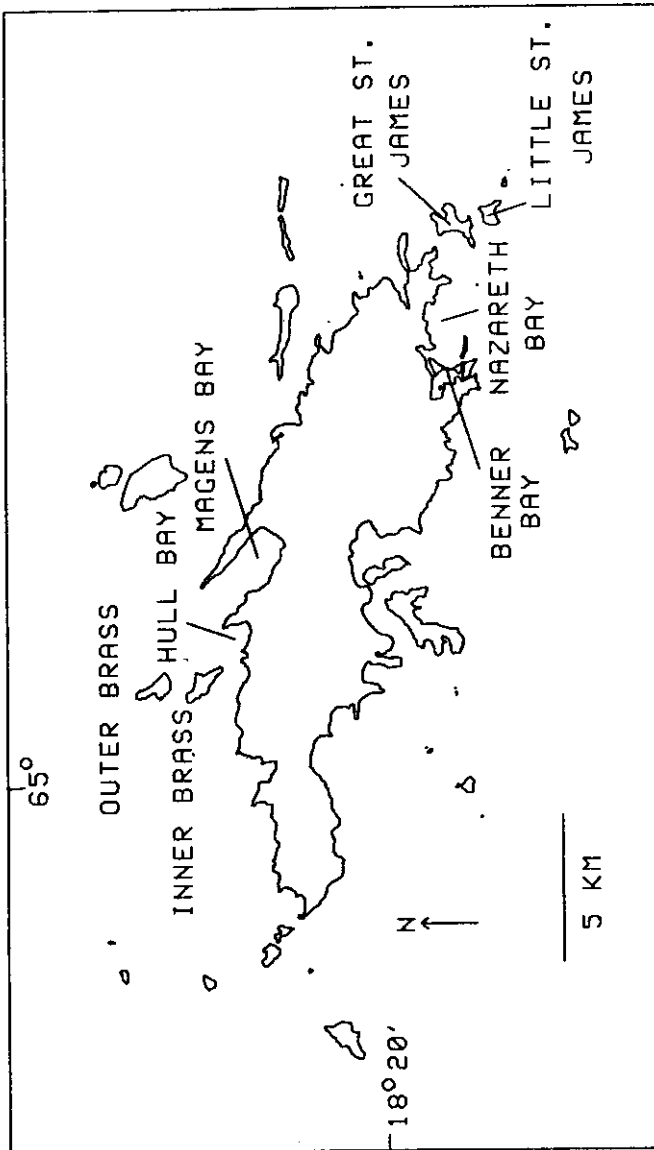


Figure 1. Locations of baitfish samples, St. Thomas, U.S. Virgin Islands.

shore where baitfish activity is frequently noted. Bays were selected from fishermen knowledge of baitfish activity and predictable and most commonly noted baitfish locations.

The approach was to note the presence or absence of baitfish in the selected bays within three days of each lunar phase, therefore, at least once per week. If present, baitfish were collected using a cast net for small baitfish species or a large seine for large species. Total weights per species were recorded for each sample along with number of cast/hauls per sample. Subsamples of one pound for large samples were taken to determine the mean number of fish per pound per species.

The study was initiated in September 1986 to develop methods; however, weekly observations were not initiated until October 1986. The study was terminated December, 1986.

Results of the fishery-independent study was compared to data obtained during the past two years based on fishermen interviews and sampling

RESULTS

The results of baitfish catches from the North and South side of St. Thomas are presented in Tables 1 and 2. Several interesting observations were derived from the data and compared to fishermen interviews.

It is readily observed from the data that anchovies were captured exclusively on the northern shore while dwarf herring was captured on the southern shore. The schools of baitfish appear to be normally monospecific, although the species composition of baitfish from the northern shore demonstrated a few false pilchard, *Harengula clupeiola*, associated with the large schools of dusky anchovy, *Anchoa lyolepis*.

On two occasions, large nets were used for capture. On October 24, a large aggregation of small dwarf herring was observed in Bareass Bay, Great St. James Island. A large fry seine was set and purse-hauled. This method was extremely efficient and netted 65.75 pounds of juvenile dwarf herring in one set.

On December 30, a large school of ballyhoo, *Hemiramphus brasiliensis* was observed in Nazareth Bay. A gill net was set and 54.0 pounds of ballyhoo were trapped.

Fishermen interviews provided knowledge on baitfish locations and movements. The difference in baitfish species composition was noted on the northern and southern shores. Several fishermen suggest that baitfish movements may be predicted on lunar cycles. Although lunar periodicity was not evident in baitfish movements during this study, dwarf herring aggregations have been noted inshore on the full moon.

Fishermen also suggest that the baitfish are extremely abundant during the summer months and migrate along the island chain from the Lesser Antilles

Table 1. Baitfish samples from selected bays on the North side of St. Thomas, U.S. Virgin Islands October-December, 1986.

Date	Moon Phase	Location	Gear Type	No. of Casts	Species	Total Weight	No. of Indiv.	No./ Pound	No./ Cast	No./ Cast
Oct.	1	Hull			No Bait					
Oct.	2	Hull			No Bait					
Oct.	3	Hull			No Bait					
Oct.	4	Hull			No Bait					
Nov.	1	Hull			No Bait					
Nov. 10	2	Hull	Cast	1	<i>Anchoa lyolepis</i>	7.63	2342	307	2342.0	7.63
Nov. 11	2	Inner Brass I.	Cast	3	<i>Anchoa lyolepis</i>	7.56	2397	317	798.8	2.52
Nov. 11	2	Magens	Cast	1	<i>Anchoa lyolepis</i>	5.25	1743	332	174.3	7.63
Nov.	3				No Bait					
Nov. 24	4	Hull	Cast	4	<i>Anchoa lyolepis</i>	13.75	4964	361	1241.0	3.44
Dec.	1				No Bait					
Dec. 9	2	Inner Brass I.	Cast	5	<i>Anchoa lyolepis</i>	19.5	5948	305	1189.5	3.9
Dec. 12	2	Inner Brass I.	Cast	4	<i>Anchoa lyolepis</i>	11.0	3564	324	891.0	2.75
Dec. 14	3	Inner Brass I.	Cast	6	<i>Anchoa lyolepis</i>	12.63	3915	310	652.6	2.11
Dec. 26	4	Hull	Cast	5	<i>Anchoa lyolepis</i>	17.0	5219	307	1043.8	3.4
Dec. 30	1	Hull	Cast	5	<i>Anchoa lyolepis</i>	7.16	2298	321	459.7	1.43

Table 2. Baitfish samples from selected bays on the South side of St. Thomas, U.S. Virgin Islands October-December, 1986.

Date	Moon Phase	Location	Gear Type	No. of Casts	Species	Weight	No. of Indiv.	No./ Pound	No./ Cast	Wt./ Cast
Oct.	1				No Bait					
Oct.	2				No Bait					
Oct. 17	3	Nazareth Bay	Cast	4	J. lamprotaenia	4.4	1320	300	330.0	1.1
Oct. 24	4	Lt. St. James	Fry Seine	1 set	J. lamprotaenia	65.75	64435	980	64435.0	65.75
Nov.	1				No Bait					
Nov.	2				No Bait					
Nov.	3				No Bait					
Nov.	4				No Bait					
Dec.	1				No Bait					
Dec.	2				No Bait					
Dec. 17	3	Benner Bay	Cast	3	J. Lamprotaenia	5.38	1420	264	473.4	1.79
Dec. 30	4	Nazareth Bay	Gill	1 set	H. brasiliensis	54.0	324	6	324.0	54.0

westward coinciding with the bird migrations. During this season, fishermen are able to net large aggregations of pelagic fishes inshore, specifically, yellowtail snapper (*Ocyurus chrysurus*).

From previous fishermen interviews conducted during the past two years, it was observed that the cast net is the most common gear type (69%). Haul nets (17%) and gill nets (14%) are also used around St. Thomas and St. John but were not documented on St. Croix although their use is probable.

The port sampling revealed that the dwarf herring, *Jenkinsia lamprotaenia*, is the most commonly caught species and is the bait species preferred by fishermen. The most utilized gear type is the local, small mesh cast net. The species is used primarily in yellowtail (*Ocyurus chrysurus*) fishing, but also for the catch of other pelagics, specifically blue runner (local common name-hardnose, *Caranx crysos*) (Refer to Tables 3 and 4). Sale prices of baitfish were difficult to obtain but ranged from \$1-2 per pound. Most bait fishermen used bait catch for their own commercial fishing.

The present investigation suggests that both dwarf herring and anchovies are common and readily captured. Anchovies were more abundant during the period of this investigation, however, their dominance in the present investigation may be due to two factors:

Table 3. Common Baitfish Species captured by commercial fishermen and commercial species fished in U.S. Virgin Islands

<i>Harengula clupeola</i> False Pilchard	<i>Euthynnus pelamis</i> – Skipjack tuna <i>Thunnus albacares</i> – Yellowfin tuna
<i>Harengula humeralis</i> Redear Sardine	<i>Lutjanus analis</i> – Mutton snapper <i>Euthynnus pelamis</i> – Skipjack tuna <i>Scomberomorus cavalla</i> – King mackerel <i>Thunnus albacares</i> – Yellowfin tuna
<i>Jenkinsia lamprotaenia</i> [*] Dwarf Herring	<i>Ocyurus chrysurus</i> – Yellowtail snapper <i>Caranx chrysos</i> – Blue runner
<i>Anchoa spp.</i> [*] Anchovies	<i>Ocyurus chrysurus</i> – Yellowtail snapper
<i>Hemiramphus brasiliensis</i> Ballyhoo	<i>Coryphaena hippurus</i> - Dolphin <i>Lutjanus analis</i> – Mutton snapper <i>Scomberomorus cavalla</i> – King mackerel

^{*} Used frequently for chum and fish trap bait.

Table 4. Results of baitfish survey based on fisherman's interviews conducted from April 1985 to March 1986 in the U.S. Virgin Islands. (From Clavijo, et al., 1986).

SPECIES	ST. THOMAS - ST. JOHN		ST. CROIX	
	WEIGHT (pounds)	% (based on weight)	WEIGHT (pounds)	% (based on weight)
CLUPEIDAE				
<i>Harangula clupeiola</i> (False pilchard)	40.5	1.9	46.0	25.0
<i>Harangula humeralis</i> (redear sardine)	59.5	2.8	30.0	16.0
<i>Jenkinsia lamprotaenia</i> (dwarf herring)	1,170.5	55.6	68.0	37.0
ENGRAULIDAE				
<i>Anchoa lyolepis</i> (dusky anchovy)	427.0	20.3	33.0	18.0
EXOCOETIDAE				
<i>Hemiramphus (unidentified)</i>	287.0	13.6	0.0	0.0
ATHERINIDAE (silversides)	120.0	5.7	0.0	0.0
CARANGIDAE				
<i>Selar crumenophthalmus</i> (bigeye scad)	0.0	0.0	7.0	4.0
OTHER (incidental catch)	2.0	0.1	0.0	0.0
TOTALS	2,106.5	100.0	184.0	100.0

Number of interviews 37

1. Dwarf herring may have been underrepresented due to an aberrant migration season.
2. Fishermen are reported to prefer dwarf herring as bait and for chum. They may select for this species although anchovies may be more abundant.

DISCUSSION

As suggested by fishermen interviewed, a difference in the baitfish species which occupy the northern and southern shores of St. Thomas exists. *Anchoa* spp. appear to prefer the North shore bays while *Jenkinsia lamprotaenia* appear to prefer the South shore. The reason for this difference has not been investigated.

It is interesting to note that the preliminary catches made in Hull Bay during September and observations made in August and September documented that the baitfish aggregations inshore were predominantly mixed schools of *H. Clupeola* and *H. humeralis*. Aggregations of anchovies were observed during this period. A large number of *H. humeralis* were noted dead during the summer aggregations. The phenomena was observed in other bays and has been documented in St. Thomas over the past two years (Clavijo *et al.*, 1986).

The cast and seine methods of capture are obviously extremely efficient in shallow water as observed from the data. Complete aggregations of baitfish in bays may be eliminated through fishing. This has been observed on several occasions around St. Thomas and St. John. If inshore migrations of baitfish coincide with reproductive activity, heavy fishing pressure may severely impact reproductive success.

Observations and fishermen interviews suggest that only a few bays are occupied by large aggregations of baitfish during migrations. It is possible that this is linked to food resources, shelter and/or other environmental factors. Observations suggest that baitfish aggregations inshore are dependent on lunar phases. Although the term of the present study was too short to support this hypothesis, a longer term study should be able to document migration patterns and attempt to define the variables responsible for migrations.

An exhaustive and critical analysis of the data from this short term study was not warranted for the following reasons:

1. The data represent only a short sampling period (3 months) and should not be extrapolated.
2. Fishermen interviewed suggested that baitfish migrations were not typical during the sampling period, especially for the *Jenkinsia lamprotaenia* migration on the South side.

3. Misuse or misinterpretation of the small and potentially aberrant data base for the period is a concern for incorrect conclusions might be made.

RECOMMENDATIONS

The following recommendations are suggested based on findings from the present study:

1. Review of existing literature and the lack of general documentation and knowledge of baitfish species suggest that a great paucity of adequate research has been conducted on these species. Due to the great importance of the forage base for tropical fisheries, especially for commercial pelagic species, a serious effort should be made to fund studies on baitfish species which are conducted for at least one year.

Specific questions in need of investigation:

- periodicity of baitfish species movements
 - factors responsible for the baitfish movements
 - food and reproductive habits of baitfish species
 - feeding preference of commercial fish species on baitfish species
2. Baitfish populations should be monitored in selected bays to assess the need for management. Fishermen suggest that baitfish populations are declining. This should be documented to determine if the baitfish fishery is in need of immediate management. If so, catch limits or closures are warranted.

REFERENCES

- Clavijo, I.E., W.J. Tobias and C.A. Jennings. 1986. Virgin Islands Commercial Fisheries Research and Development Project (PL 88-309). Project No. 2-411-R-2 Annual Report. April 1, 1985-March 31, 1986. DCCA, Division of Fish & Wildlife.