SCRS/1993/040

YELLOWFIN TUNA CATCH AND EFFORT DATA FROM BARBADOS, GRENADA, ST. LUCIA AND ST. VINCENT AND THE GRENADINES

Col.Vol.Sci.Pap. ICCAT, 42 (2) : 199-203 (1994)

Mahon, R., S. Singh-Renton*, S. Jennings-Clarke**, J. Rennie***, R. Ryan****, S. Willoughby*****

** Pelagic and Reef Fishes Resource Assessment Unit, CARICOM Fishery Resource Assessment and Management Program, Tyrell St., Kingstown, St. Vincent and the Grenadines*
*** Fisheries Division, Ministry of Agriculture, Lands and Fisheries, Manoel Street, Castries, St. Lucia*
**** Fisheries Division, Ministry of Agriculture, Forestry and Fisheries, St. Georges, Grenada*
**** Fisheries Division, Ministry of Agriculture, Industry and Labour, Kingstown, St. Vincent and the Grenadines*
***** Fisheries Division, Ministry of Agriculture, Food and Fisheries, Bay Street, Bridgetown, Barbados*

SUMMARY

Catch and effort data, from the pelagic fisheries of Grenada, Barbados, St. Lucia and St. Vincent and the Grenadines were examined to determine the importance of yellowfin tuna to these fisheries. In Barbados, all large tunas are recorded together as "tuna". "Tuna" consists mostly of yellowfin tuna and usually comprises less than 4% of the catch. In the other islands, however, yellowfin tuna comprise a larger percentage of the overall pelagic catch: 40% of the main west coast catch of Grenada, 17.3-30.8% of the main east and southeast coast catch in St. Lucia, and about 10% of the catch landed at Kingstown market in St. Vincent during 1990-91.

Seasonal trends in yellowfin CPUE differs somewhat among the islands. In Grenada and St. Lucia, yellowfin CPUE tends to be highest during the main pelagic season. However, in St. Lucia, a second less prominent peak occurs as the main pelagic season ends and may reflect a shift in effort due to a decrease in the principal target species, dolphinfish. Also, in Barbados where yellowfin are caught only incidentally, CPUE values are highest just prior to and immediately after the main pelagic season. Again, this may reflect a shift in effort when major targeted species are not abundant. In St. Vincent, yellowfin are taken during the main pelagic fishing period, December-June, but no distinct peaks in CPUE are observed.

Data from Grenada indicate an overall increase in yellowfin CPUE with time, probably due to an increase in fishing power of vessels during that time. In Barbados, yellowfin CPUE shows relatively little change, although total pelagic CPUE shows a general increase with time. The absence of a definite time trend for yellowfin in Barbados may be due to the fact that yellowfin are not specifically targeted. In St. Vincent, besides a small increase noted in 1981, yellowfin CPUE shows no definite trends. The CPUE time series for St. Lucia is short and is not presented.

RESUME

Les données de prise et d'effort des pêcheries pélagiques de Grenade, des Barbades, de Ste. Lucie et de St. Vincent-Grenadines ont été examinées pour déterminer l'importance de l'albacore pour ces pêcheries. Aux Barbades, tous les grands thonidés sont enregistrés ensemble en tant que "thons". Ces "thons" se composent en majeure partie d'albacore, et représentent moins de 4 % de la prise. Dans d'autres îles, toutefois, l'albacore représente un plus fort pourcentage de l'ensemble de la pêche pélagique: 40 % de la principale prise sur la côte ouest de Grenade, 17,3 % à 20,8 % de la principale capture sur les côtes est et sud-est de Ste. Lucie, et 10 % environ de la prise débarquée à la criée de Kingstown, à St. Vincent, en 1990-91.

Les tendances saisonnières de la CPUE de l'albacore diffèrent quelque peu d'une île à l'autre. A Grenade et à Ste. Lucie, la CPUE de l'albacore a tendance à être plus élevée pendant la principale saison des pélagiques. Par contre, à Ste. Lucie, un second pic moins accusé se produit vers la fin de la principale saison des pélagiques, reflétant peut-être un déplacement de l'effort dû à une diminution de la principale espèce visée, les coryphènes. En outre, aux Barbades, où l'albacore n'est capturé que de façon accidentelle, les valeurs de la CPUE sont plus élevées juste avant et juste après la principale saison des pélagiques. Ici aussi, ceci reflète peut-être un déplacement de l'effort lorsque les espèces visées n'abondent pas. A St. Vincent, l'albacore est capturé pendant la principale saison de pêche pélagique, décembre-juin, mais sans qu'il soit observé de pics déterminés.

Les données de Grenade indiquent un accroissement global de la CPUE de l'albacore avec le temps, ce qui est probablement dû à une augmentation de la puissance de pêche des bateaux pendant la même période. Aux Barbades, la CPUE de l'albacore montre relativement peu de changements, bien que la CPUE pélagique totale montre un accroissement général dans le temps. L'absence d'une tendance temporelle définie pour l'albacore aux Barbades pourrait être due au fait que l'albacore n'y est pas spécifiquement visé. A St. Vincent, à part un léger accroissement observé en 1981, la CPUE de l'albacore ne montre pas de tendande définie. La série temporelle de CPUE pour Ste. Lucie est brève et n'est pas présentée.

RESUMEN

Se examinaron datos de captura y esfuerzo, de las pesquerías pelágicas de Grenada, Barbados, St.Lucia y St.Vincent y Grenadines, para determinar la importancia que tiene el rabil para estas pesquerías. En Barbados, todos los grandes túnidos se registran juntos como "túnidos". Estos "túnidos" se componen sobre todo de rabil y por lo general constituyen menos del 4% de la captura. En las otras islas, sin embargo, el rabil constituye un mayor porcentaje de la captura pelágica global: 40% de la principal captura de la costa oeste de Grenada, 17.3-20.8% de la principal captura de las costas este y sudeste de St.Lucia y aproximadamente el 10% de la captura desembarcada en el mercado de Kingstown, en St.Vincent, durante el período 1990-1991.

Las tendencias estacionales de la CPUE del rabil difieren algo entre las islas. En Grenada y St.Lucia, la CPUE del rabil tiende a su máximo durante la principal temporada pelágica. Sin embargo, en St.Lucia tiene lugar un máximo, segundo en importancia, a finales de la principal temporada pelágica, lo que podría reflejar un desplazamiento del esfuerzo debido a un descenso en la principal especie objetivo, la lampuga. También, en Barbados, donde el rabil se captura solo accidentalmente, los valores de CPUE son máximos justo antes e inmediatamente después de la principal temporada pelágica. Una vez más, este hecho podría reflejar un desplazamiento del esfuerzo cuando las principales especies objetivo no son muy abundantes. En St.Vincent, el rabil se obtiene durante la principal temporada de pesca pelágica, diciembre-junio, pero no se observan máximos definidos en la CPUE.

Los datos de Grenada indican un incremento global, en el tiempo, en la CPUE del rabil, debido probablemente a un aumento en la potencia pesquera de los barcos en ese período. En Barbados, la CPUE del rabil presenta un cambio relativamente escaso, si bien la CPUE total pelágica muestra un aumento general en el tiempo. La ausencia de una tendencia temporal definida para el rabil en Barbados, podría atribuirse al hecho de que el rabil no sea una especie objetivo. En St.Vincent, exceptuando un ligero incremento observado en 1981, la CPUE del rabil no presenta tendencias definidas. La serie temporal de CPUE para St.Lucia es corta y no se presenta.

The absence of a definite time trend for yellowfin in Barbados may be due to the fact that yellowfin tuna is not specifically targeted. In St. Vincent, besides a small increase noted in 1981, yellowfin CPUE shows no definite trends. The CPUE time series for St. Lucia is short and is not presented.

INTRODUCTION

The fisheries of Grenada, Barbados, St. Lucia and St. Vincent and the Grenadines have been described in several publications, and brief descriptions have also been given in Mahon *et al.* (1992- SCRS/92/68). Mahon and Rosenberg (1988) cite several papers which provide information on fleet size and composition in these and other islands of the eastern Caribbean and describe the data collection systems currently implemented. The four mentioned islands have relatively important offshore pelagic fisheries. These offshore pelagic fisheries currently target species such as dolphinfish (*Coryphaena hippurus*), king mackerel (*Scomberomorus cavalla*), and wahoo (*Acanthocybium solanderi*). In Barbados, flyingfish (*Hirundichthys affinis*) is also an important target species. Yellowfin tuna is usually taken only as a by-catch. In Grenada and in St. Lucia, however, yellowfin tuna (*Thunnus albacares*) is one of several target species and comprises a notable portion of the main catch. Furthermore, with the introduction of larger boats and more powerful gear in these islands in recent times (Mahon and Singh-Renton, 1992), yellowfin tuna may become more important as a directed species.

This document describes trends in yellowfin tuna landings and catch per unit effort (CPUE) in the four islands during the 1980s in years for which data are available. It is based on a wider analysis of pelagic fisheries in these islands (Mahon *et al.*, 1990). Data sources and analyses used here are therefore the same as those noted in Mahon *et al.* (1990, 1992).

CATCH COMPOSITION OF PELAGIC FISHERIES

Tables 1 to 4 in Mahon *et al.* (1992) show the catch composition of landings at main landing sites in the four islands. In Barbados, fish landings, and effort in number of trips, are recorded at primary and secondary landing sites (Bell *et al.*, 1988). The longest time-series are for the two major landing areas: Oistins, in the south (since 1961), and Speightstown (since 1958) in the northwest (see fig. 1, Mahon *et al.*, 1992). Traditionally, large pelagics are caught by trolling. However, in recent years several small longline vessels have been fishing. They operate primarily from the fishing complex in Bridgetown which opened in 1990. Yellowfin tuna is usually recorded together with other tunas as 'tuna'; 'tuna' contributes relatively little to the total landings, comprising less than 4%.

In Grenada, there are three major landing sites, Melville Street, Gouyave, and Grenville (Finlay *et al.*, 1988). The composition of the catch appears to differ considerably among these three sites (table 2, Mahon *et al.*, 1992). At Grenville, the pelagic catch is taken entirely by trolling, with yellowfin tuna comprising less than 2% of the catch. In contrast, at Gouyave and Melville Street in the west and southwest respectively, where mostly artisanal longline gear is employed, an average of 41.6-47.3% of the catch consists of yellowfin tuna.

In St. Vincent, Kingstown is the main landing site for large pelagics which are caught primarily by trolling (Morris, 1984; Morris *et al.*, 1988). During the period 1979-1989, only 0.5% of the catch landed at Kingstown market consisted of yellowfin tuna (table 4, Mahon *et al.*, 1992). In 1990-1992, however, yellowfin tuna catches were greater, making up 10.1% of the catch. In both Grenada and St. Vincent, the fleets have recently expanded to include longline vessels (15m) which catch a larger than usual proportion of yellowfin. However, data on catches by these vessels are not yet available.

In St. Lucia, large pelagics are caught by trolling which takes place predominantly on the east and southeast coasts (Murray *et al.*,1988). The species composition of the catch at the three major sites, was remarkably similar for the period 1984-1989 (table 3, Mahon *et al.*, 1992). On average, yellowfin tuna comprised 17.3--20.8% of the catch.

TRENDS IN CATCH PER UNIT EFFORT

All CPUE time series have been calculated as described in Mahon *et al.* (1992).

Barbados

In Barbados the seasonal pattern of effort is similar at both Speightstown and Oistins, being minimal in August and September, and peaking in April/May (Mahon *et al.*, 1990, 1992). As may be expected, total pelagic landings and total pelagic CPUE show a similar seasonal pattern to that of fishing effort, with the main peak observed during April to May and the lowest figures recorded for August and September. The seasonal pattern for 'tuna' CPUE suggests bimodality (fig. 1a, 1b). The peak periods occur just prior to and immediately after the main pelagic season and could be the result of a shift in effort to catch other available species, when major target species, dolphinfish and flyingfish, are not very abundant. In addition, the low CPUE observed during August-October is more likely due to the reduction in fishing effort during this time rather than a true low in 'tuna' abundance.

Mahon *et al.* (1990) noted a steady increase in the average annual CPUE for all pelagics with time. This observed increase in CPUE is likely to be a result of increased fishing power of launches over this time period (Oxenford and Hunte, 1987). At Speightstown, 'tuna' CPUE showed a fairly rapid decrease during the late 1950s and early 1960s after which it remained low with some fluctuation observed (fig. 2a). At Oistins, 'tuna' CPUE showed more pronounced fluctuation, except during 1967-1975 when it remained constant (fig. 2a). As previously noted, the local fisheries are not 'tuna' directed and so observed changes in CPUE are probably more driven by the CPUEs of major targeted species rather than true 'tuna' abundance.

Grenada

At Gouyave and Melville Street the fishing effort is not only for pelagic fishing, and as there is a significant amount of non-pelagic fishing in the off-season, the pelagic season is best defined by the landings: pelagic landings are highest during January-February and May-June (Mahon *et al.*, 1990, 1992). At Gouyave, the peaks in fishing effort and pelagic landings correspond closely, indicating that the effort is primarily for pelagics. At Melville St., however, fishing effort is highest between July and December, implying that there is a considerable amount of non-pelagic fishing effort during the course of the year at Melville St. (See figs 4 & 5 in Mahon *et al.*, 1992).

The seasonal pattern in yellowfin tuna landings is generally similar to that of the total pelagic landings, and this is to be expected since yellowfin tuna comprise close to half the total pelagic catch (fig. 1c, 1f). At the Melville Street landing site, average seasonal CPUE for yellowfin tuna increased little over time until 1989 when it increased substantially (fig. 2b). At Gouyave, yellowfin CPUE also showed a general upward trend from 1982 to 1986, then decreased slightly in 1987 and remained fairly constant up to 1989 (fig. 2b). It should be noted that these average values are for the months of January to June only and are weighted by fishing effort. Since both landing sites are located on the same side of the island, the fishing areas are likely to be physically close to each other. Hence, the differences in the trends obtained for the two sites from 1986 onwards is an unexpected result. These conflicting trends were also noted for billfish CPUEs described in Mahon *et al.* (1992). These workers suggested the possibility that these fish may be aggregating in a very small area near Grenada, and that in some years this area is accessible to Melville Street, whereas in others it is accessible to Gouyave. However, further information and additional data are needed to reach a more accurate conclusion.

St. Lucia

In St. Lucia, the average catch per pelagic trip (weighted by the number of trips) from January to June was used as an index of abundance. Effort for pelagics is available separately from total effort in St. Lucia. Most pelagic fishing occurs during December to July, with peak activity during January to May. The seasonal pattern of yellowfin tuna CPUE appears bimodal, with a major peak observed during the middle of the main pelagic season and a minor peak occurring during June just as the pelagic season comes to a close (fig. 1e). Highest CPUEs within the main pelagic fishing period is expected as yellowfin tuna is the third most important species landed at Dennery. A minor peak in CPUEs occurring at the tail end of the pelagic season infer a possible shift in directed effort as the main targeted species, dolphinfish, becomes less abundant (Mahon *et al.*, 1990). The average annual CPUE series contained only 5 years of data and is not presented here since no specific trends were apparent. The interested reader is referred to Mahon *et al.* (1990).

St. Vincent and the Grenadines

The average CPUE from September to the following August was used as an index of abundance (Mahon *et al.*, 1990). The pelagic season extends from December to July, with peak effort occurring during February to June (*op. cit.*). The data indicate that yellowfin tuna are not caught outside of the pelagic season; within the pelagic season, however, there are no distinct peaks and some obvious fluctuation (fig. 1d). This may be due to the index of effort used, which is not very precise, as noted in Mahon *et al.* (1990). Average annual yellowfin CPUE showed a peak in 1981, besides which it remained relatively constant (fig. 2c).

DISCUSSION AND CONCLUSIONS

Except for Barbados, and for St. Vincent in the 1980s, yellowfin tuna catches comprise from 10% to over 40% of main pelagic catches taken in the islands. In St. Vincent, also, the actual amount of yellowfin tuna landed is probably more than the quoted figure, as young yellowfin tunas are recorded together with other small tunas as 'small tunas'.

In Barbados, where yellowfin ('tuna') is not targeted, yellowfin ('tuna') CPUE shows a seasonal pattern with peaks occurring just before and after the main peak of pelagic fishing activity. During these periods, principal target species are not very abundant, and hence the observed peaks in yellowfin ('tuna') CPUE may simply reflect a shift in fishing effort to non-targeted species.

At Gouyave and Melville Street in Grenada, the seasonal pattern of yellowfin landings is generally similar to that of the overall pelagic landings. This is expected as yellowfin tuna is one of the dominant species of the catch. Total pelagic and yellowfin CPUEs show general increases with time, and this is probably due to increased fishing power such as increased boat size, engine size and improved equipment, particularly the introduction of longlines.

At Dennery in St. Lucia, yellowfin CPUE indicates two periods of peak abundance. Highest CPUEs are recorded during February-March which is also the period in which total pelagic CPUE and fishing effort are highest. Yellowfin tuna is the third most important species caught and hence this result is not unexpected. A second lower peak in yellowfin CPUE occurs during June when pelagic fishing effort has begun to decline signalling the end of the main pelagic season. This second peak may be due to a shift in effort as the principal target species, dolphinfish, becomes less abundant. In St. Vincent, the seasonal pattern of yellowfin CPUE appears to fluctuate about a relatively low level during the main pelagic season. However, the observed pattern is likely to be strongly influenced by at least two factors other than fish abundance; yellowfin is not a major target species, and CPUE has been estimated indirectly. Hence, more data are needed before making conclusions about a seasonal trend in CPUE. Zero CPUEs outside of the main pelagic season may simply be a reflection of the minimal pelagic effort applied at this time.

In general, more accurate data on catch and effort are needed to evaluate seasonal trends in yellowfin CPUE. Yellowfin catches need to be recorded separately in Barbados. In St. Vincent, a more direct method of estimating CPUE is needed. There is also a need for the separate recording of effort for pelagic fishing in Grenada.

REFERENCES

BELL, J., C. St. Hill, S. Willoughby, and R. Mahon. 1988. A fishery data collection system for Barbados. pp. 71-82. In: R. Mahon and A.A. Rosenberg [ed.]. Fishery data collection systems for eastern Caribbean islands. OECS Fishery Report No. 2.

FINLAY, J., Rennie, J., R. Mahon, and A. A. Rosenberg. 1988. A fishery data collection system for Grenada. pp. 105-120. In: R. Mahon and A.A. Rosenberg [ed.]. Fishery data collection systems for eastern Caribbean islands. OECS Fishery Report No. 2.

MAHON, R. and A. A. Rosenberg [ed.]. 1988. Fishery data collection systems for eastern Caribbean islands. OECS Fishery Report No. 2: 185 pp.

MAHON, R. and S. Singh-Renton. 1992. Report of the CARICOM Fisheries Resource Assessment and Management Program (CFRAMP). ICCAT Working Document SCRS/92/154.

MAHON, R., F. Murphy, P. Murray, J. Rennie, and S. Willoughby. 1990. Temporal variability of catch and effort in pelagics fisheries in Barbados, Grenada, St. Lucia, and St. Vincent: with particular reference to the problem of low catches in 1989. FAO FI:TCP/RLA/8963 Field Document No. 2: 74 pp.

MAHON, R., J. Rennie, R. Ryan and S. Singh-Renton. 1992. Billfish Catch and Effort Data from Barbados, Grenada, St. Lucia and St. Vincent and the Grenadines. ICCAT Working Document SCRS/92/68.

MORRIS, K., J. Cruikshank, and R. Mahon. 1988. A fishery data collection system for St. Vincent and the Grenadines. pp. 150-163. In: R. Mahon and A.A. Rosenberg [ed.]. Fishery data collection systems for eastern Caribbean islands. OECS Fishery Report No. 2.

MURRAY, P., J. Charles, and R. Mahon. 1988. A fishery data collection system for St. Lucia. pp. 140-149. In: R. Mahon and A.A. Rosenberg [ed.]. Fishery data collection systems for eastern Caribbean islands. OECS Fishery Report No. 2.

OXENFORD, H. A. and W. Hunte. 1987. Long-term trends in abundance of the dolphin, *Coryphaena hippurus*, near Barbados. Proc. Gulf Caribb. Fish. Instit. 38: 499-510.

Table 1. Annual landings of yellowfin tuna by country (mt)

Year	Barbados	St. Lucia	St. Vincent	Grenada	Total
1980	67	27	0	-	581
1981	30	25	1	51	120
1982	36	26	0	45	121
1983	51	23	0	128	243
1984	90	56	1	97	293
1985	57	79	0	86	306
1986	39	125	0	239	670
1987	57	76	0	186	319
1988	236	97	0	215	548
1989	62	70	1	236	368
1990	89	88	20	304	432
1991	108	-	24	355	132
1992		-	*22	341	22

* Includes 3 mt of landings from outside Kingstown. Other years are for Kingstown only.

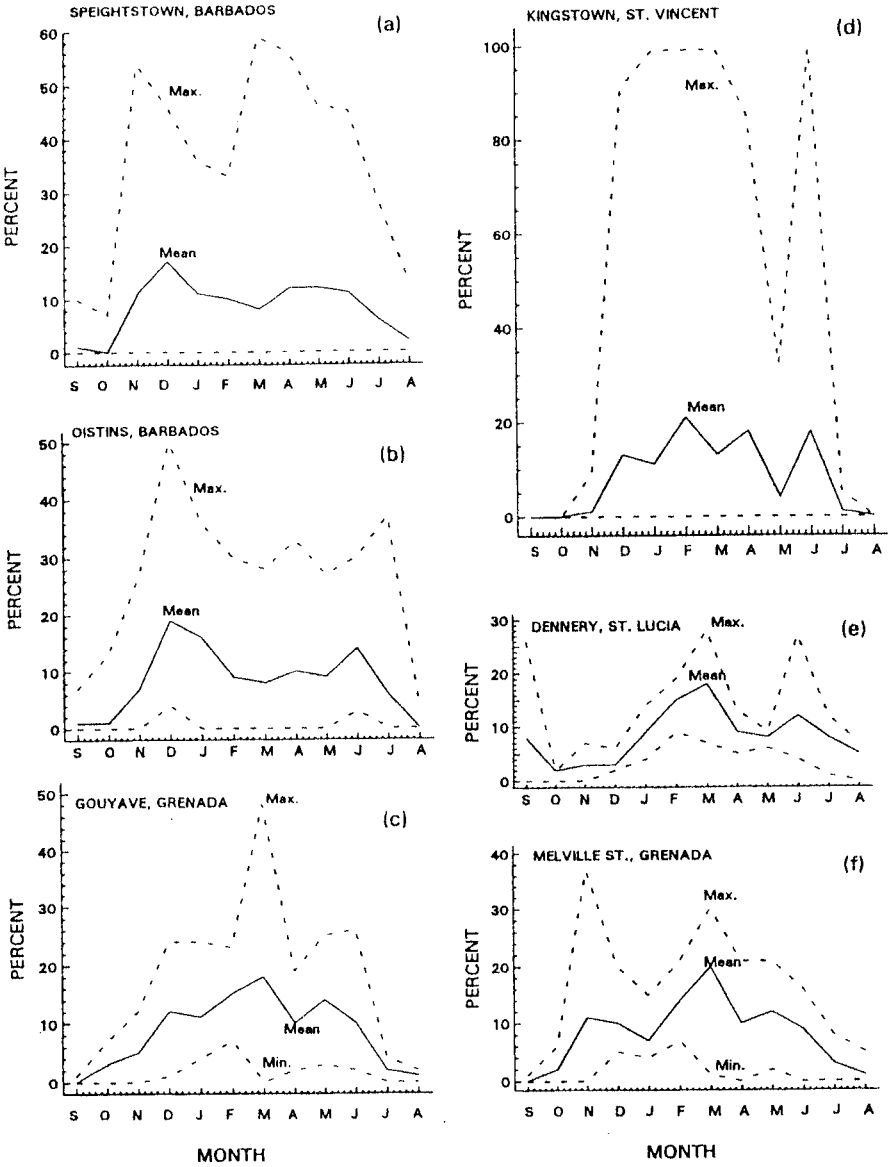

Figure 1. The seasonal pattern of yellowfin tuna landings at major landing sites in the southeastern Caribbean.

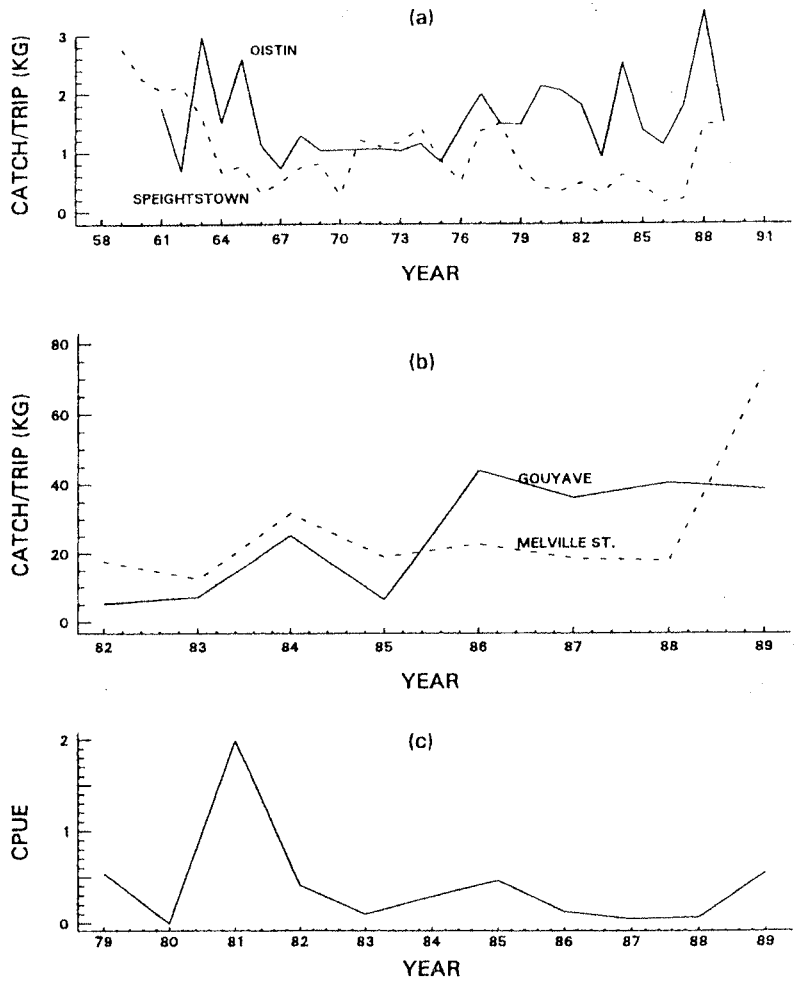

Figure 2. Trends in CPUE for yellowfin tuna at major landing sites in the southeaster Caribbean.