

Seasonality of *Octopus cyanea* maturity and livelihoods of octopus fishers in northern Mozambique: implications for management

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Introduction

Fishing for octopus is an important **subsistence and income-generating** activity for coastal communities in Cabo Delgado (Northern Mozambique, Fig. 1). **Women** harvest octopus and other intertidal resources by gleaning on intertidal reefs (Fig. 5). **Men** fish octopus mostly through free-diving on the reef edge, in sub-tidal areas.

Community-led octopus closures (temporary reserves and temporal closures) are a form of management with potential to improve fishers' octopus harvests. These measures are most effective when linked to the two critical periods of octopus life cycle, being: **1)** the brooding season; and **2)** the recruitment period. However, taking into account seasonality of fisher's livelihoods and income sources is also essential to ensure fishers can support the closures.

Objectives

1. Understand the most **biologically appropriate** time for octopus management for the Cabo Delgado's artisanal fishery.
2. Identify the most appropriate time for octopus closures for fishers, taking into account their **livelihood** needs.

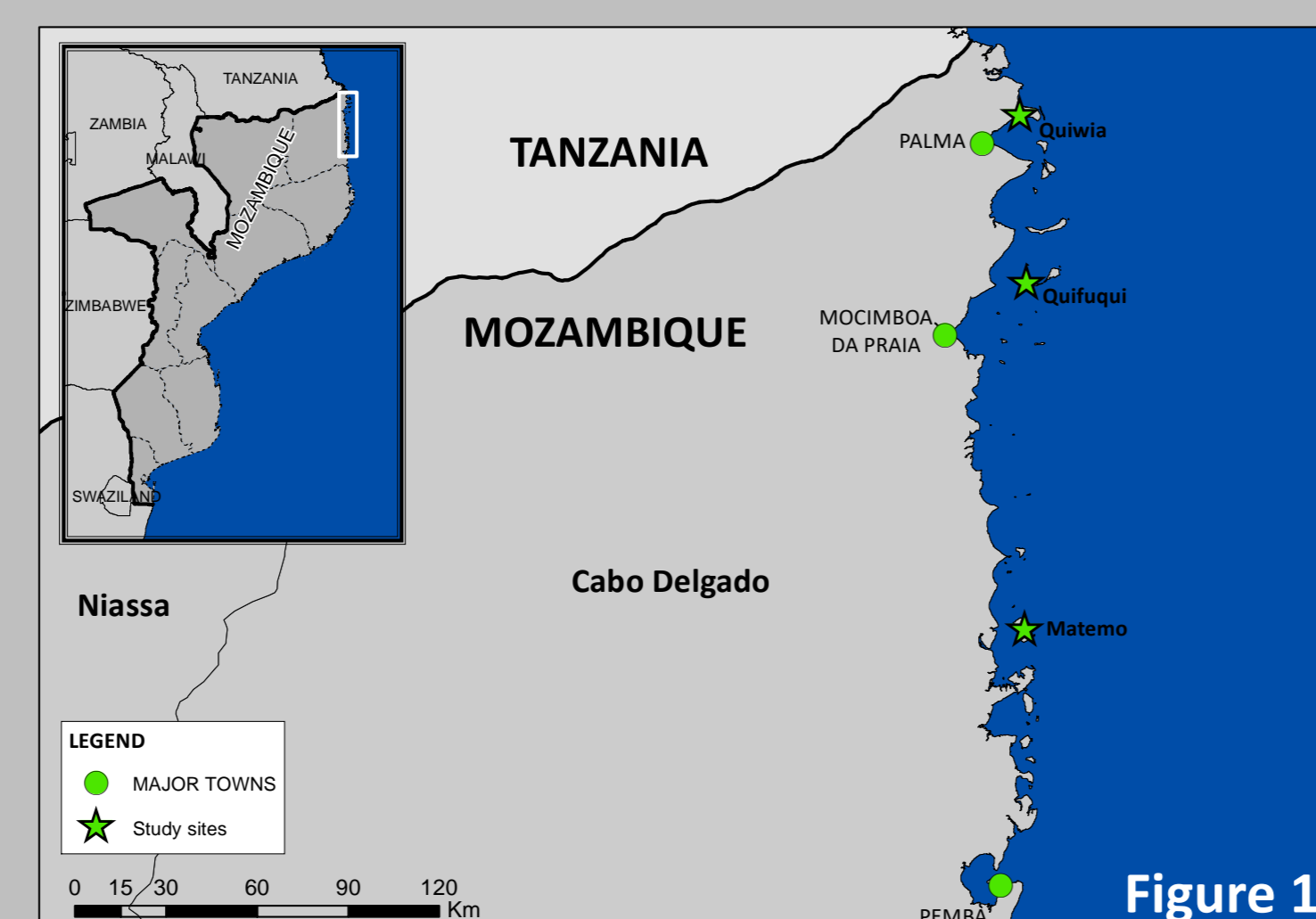


Figure 1

Methods

Two-year **octopus maturity monitoring**, collecting data from octopus' traders (Fig. 2). General Linear Models were used to identify: **1)** Octopus brooding peaks (higher proportion of mature females); and **2)** Recruitment peaks (higher frequency of small size octopus).

Focus Group Discussions (FGD) with octopus fishers, disaggregated by fishing gear and technique, and therefore gender (Fig. 3). **Seasonal calendars** were used to understand fishers' fishing frequency and catch, and how octopus fishing is combined with other livelihood activities.

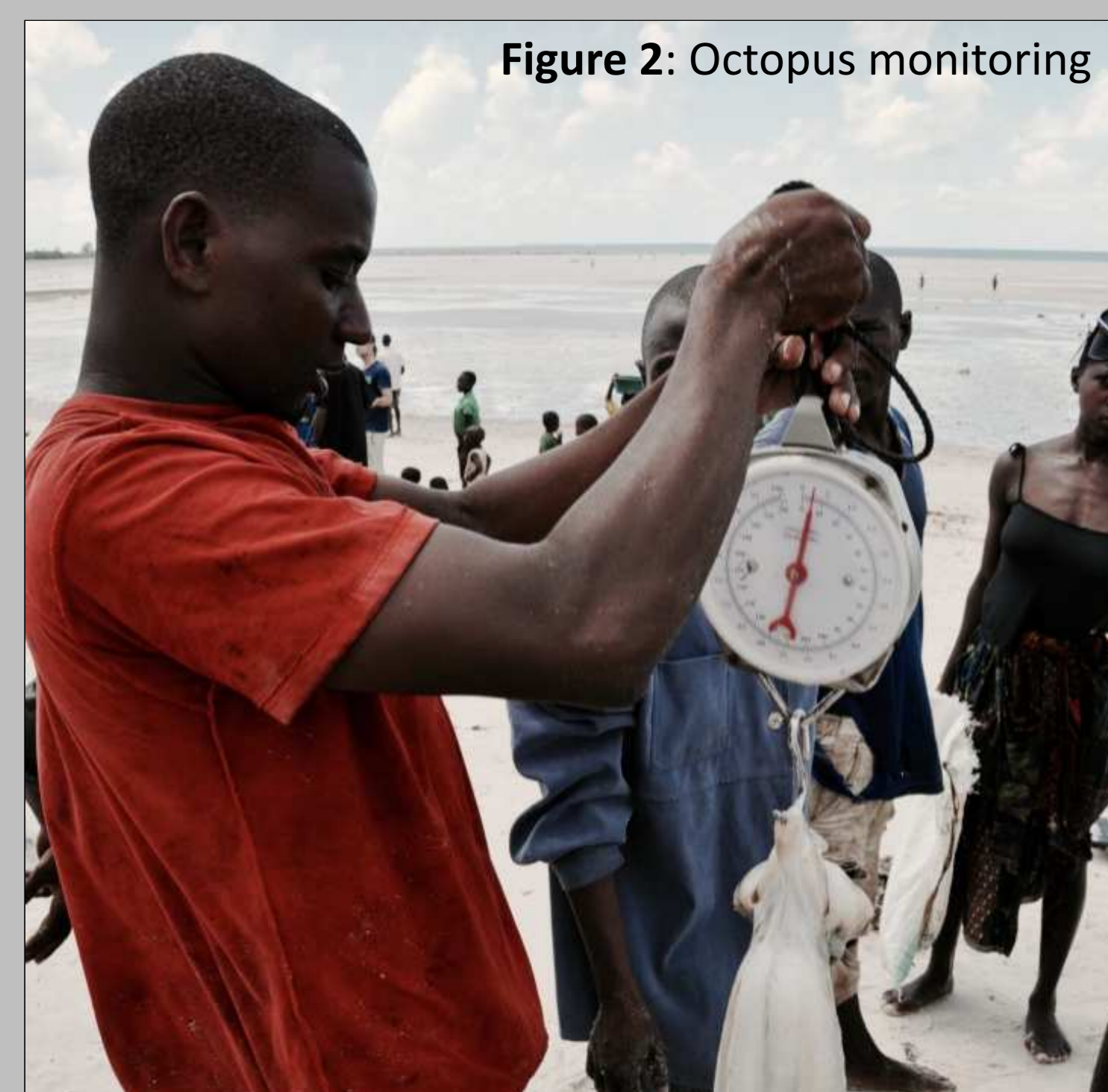


Figure 2: Octopus monitoring



Figure 3: FGDs

Figure 4: Seasonality of livelihoods and octopus maturity

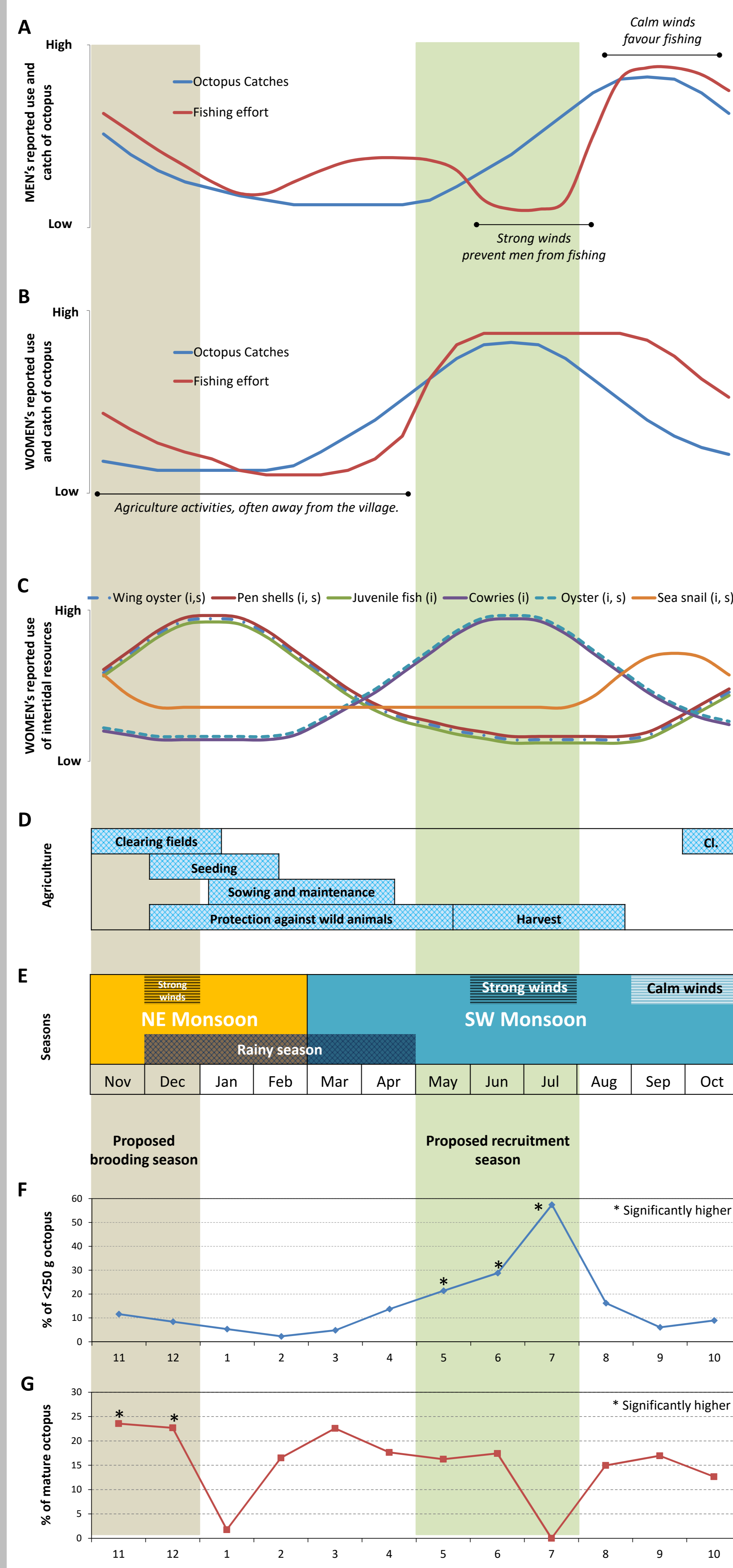


Figure 5: Harvesting intertidal resources in Matemo Island



Findings

Brooding and recruitment seasons

The **main brooding season** of *O. cyanea* in Cabo Delgado appears to be between November to December, with an intense, significant peak in the number of mature females during these months (Fig. 4G). This supports other studies conducted in the South West Indian Ocean and might be related to the higher water temperatures during this period.

The **main recruitment period** for *O. cyanea* in Cabo Delgado appears to happen from May to August (Fig. 4F), when the number of octopus weighing less than 250g is significantly higher. This matches the expected time required since the brooding peak in November until octopus is recruited into the fishery.

Livelihoods seasonality

Fishers reported **highest** fishing effort and catch per unit effort (CPUE) for octopus occurs during the **dry season** (Apr. - Oct.), with **differences for men and women** (Fig. 4). Women reported that both fishing effort and CPUE peak at the mid-dry season (Jul. - Aug.), whilst men reported this peak is at the end of the dry season (Sep. - Oct.). Prices for octopus are higher during the dry season.

During the **rainy season** (Nov. - Apr.) fishers reported that fishing effort and CPUE for octopus are **lower** than the dry season (Fig. 4). Both for men and women, water turbidity makes sight-fishing more challenging and reduces catch. In addition, drying fish and octopus is harder and there is more wastage, so demand and prices for octopus are lower.

Management recommendations

Closing temporary reserves to protect the recruitment season (May-Aug.), which will increase fishers' catches at the opening. Since this is the period of highest effort and catches for women, and prices are higher, a temporary reserve over part of the intertidal area, selected by women, is preferred than a complete octopus ban.

Protection of the brooding season (Nov. - Dec.). Protection should include subtidal areas where female mature octopus reproduce, either through **1)** large temporary reserve so as to include subtidal grounds; or **2)** a complete ban of octopus fishing. Fishers explained that this period would be the preferred time for octopus closures, since octopus fishing and market is lower at this time of year.