

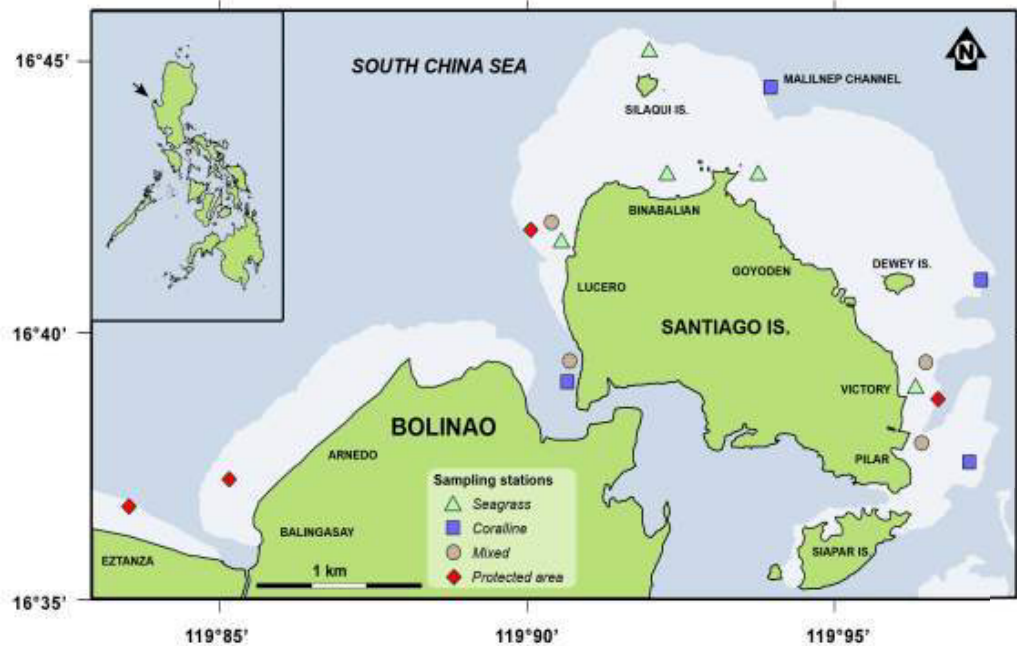
# Establishment and management of communal sandfish (*Holothuria scabra*) sea ranching in the Philippines

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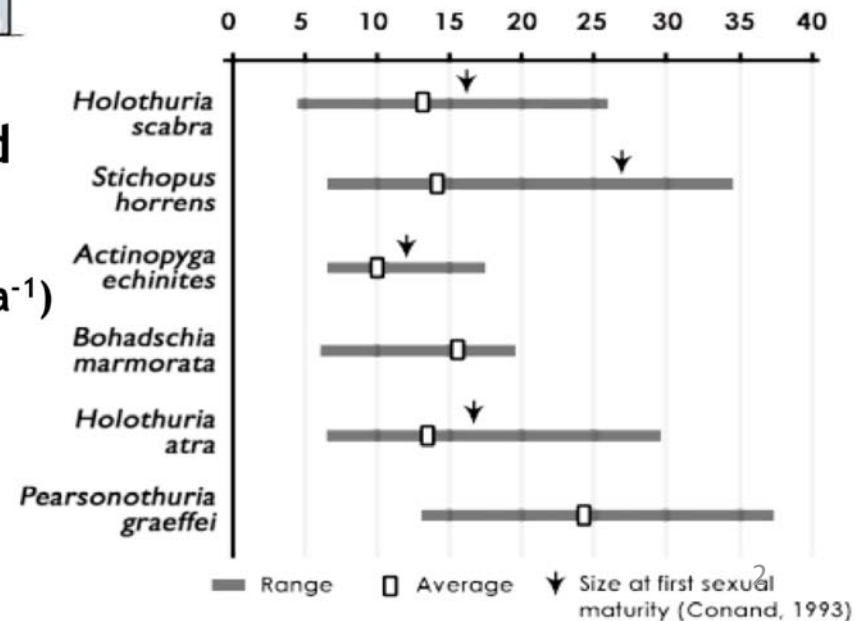
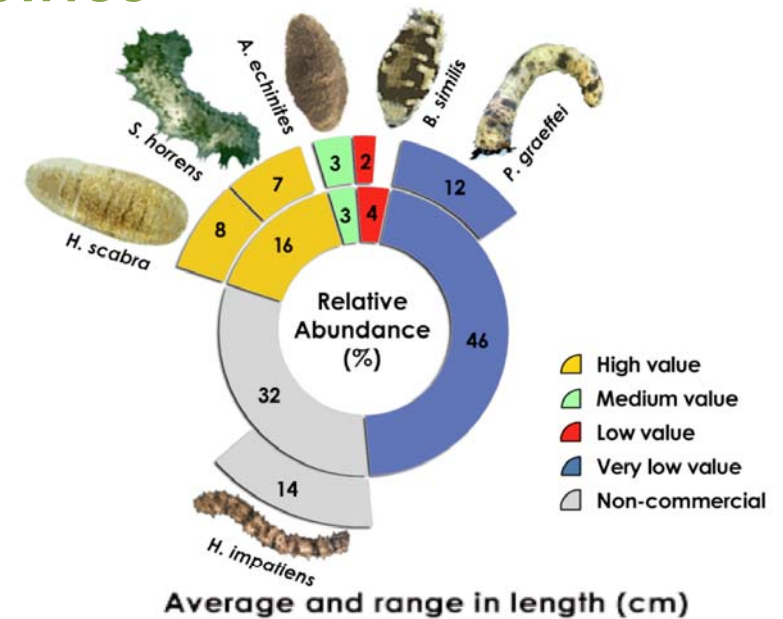


# Status of sea cucumber fishery resource Bolinao, Philippines



- High species richness (40 species) and diversity ( $H=2.67$ )
- Low population densities ( $0.3$  to  $9 \text{ ind. ha}^{-1}$ )
  - *Holothuria scabra* ( $5.2 \text{ ind. ha}^{-1}$ )
- Majority immature

(Olavides et al., *in press*)



# *Holothuria scabra* "sandfish"



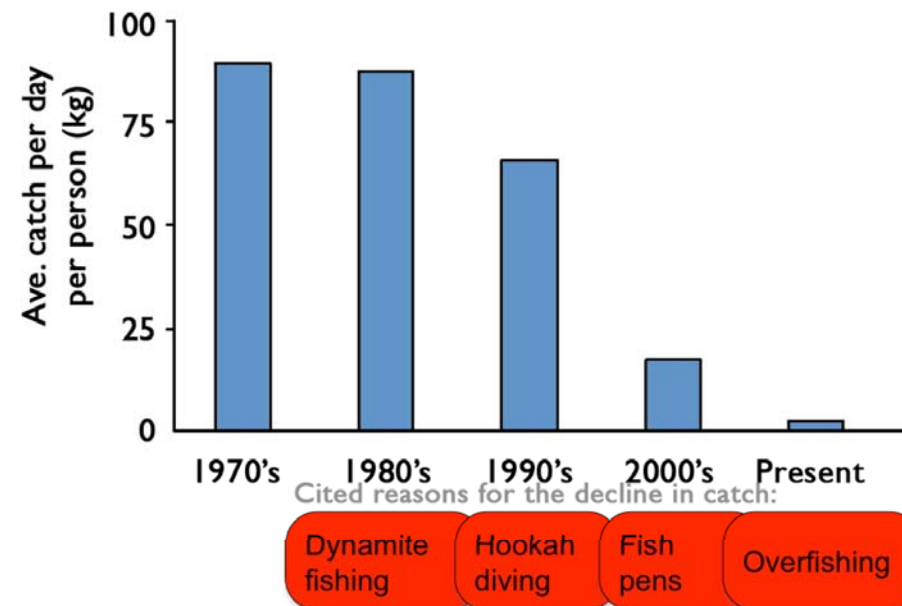
SPECIES NAME		TOTAL FOR ALL HABITATS (17,250 m <sup>2</sup> )		
		COUNT	REL. ABUN.	DENSITY (ind has <sup>-1</sup> )
COMMERCIAL	<i>Actinopyga echinites</i>	3	2%	1.74
	<i>Bohadschia similis</i>	2	1%	1.16
	<i>Holothuria atra</i>	1	1%	0.58
	<i>Holothuria fuscocinerea</i>	11	7%	6.38
	<i>Holothuria leucospilota</i>	49	31%	28.41
	<i>Holothuria pervicax</i>	2	1%	1.16
	<i>Holothuria scabra</i>	9	6%	5.22
	<i>Pearsonothuria graeffei</i>	5	3%	2.90
	<i>Stichopus horrens</i>	7	4%	4.06

(Olavides et al., *in press*)

## Sandfish (*Holothuria scabra*):

- Among the most valued tropical sea cucumber species.
- Year round spawners
- Short larval period
- Sedentary, inhabiting inshore areas (e.g seagrass beds)

## Reported average catch in Bolinao



Source: 16 respondents trepang fishers for >30 years



# Establishment of pilot sea ranching site



**1 Bio-physical suitability assessment**



**2 Community orientation & public consultation (IEC)**



**3 Presentation to LGU & securing legal permits (use rights)**

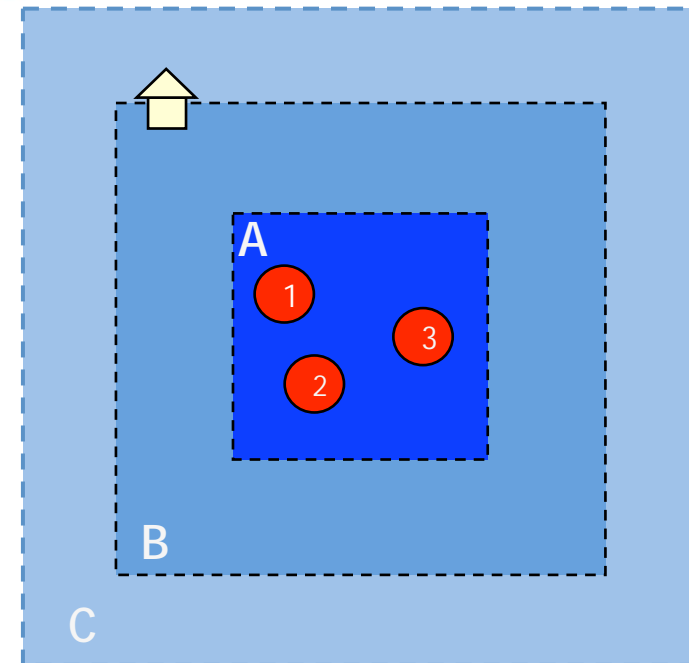


**4 Planning workshop & partnership agreement (capability building)**



**5 Site delineation & development**

# Sea cucumber ranch - design and location of sites

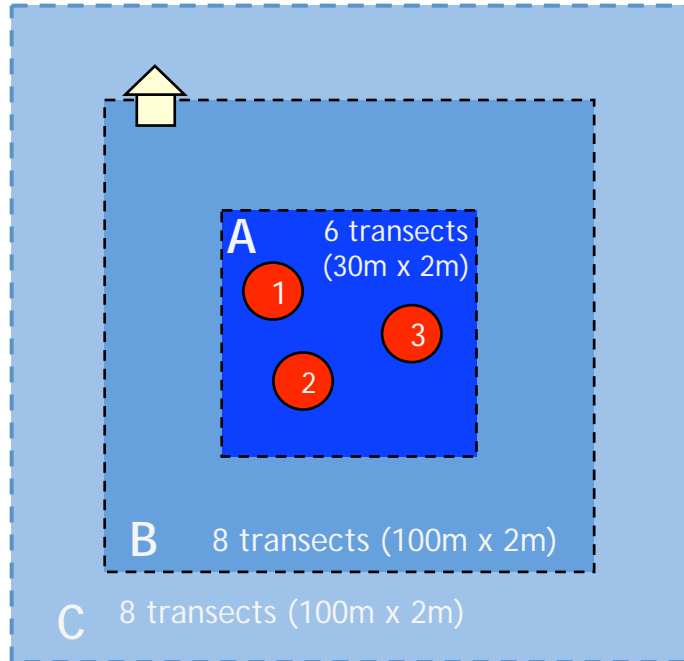


- Zone A** 2,500 sq.m. (50 m x 50 m) Core Release Area  
With three 100 sq.m. circular monitoring pens
- Zone B** 1-hectare (100 m x 100 m) Nursery Area  
Only monitoring of sea cucumbers allowed
- Zone C** 5-hectare Buffer Area  
No-take area for sea cucumbers; other legal activities allowed

**Rights holders** : exclusive harvest rights for sea cucumber in 5-hectare area and exclusive access - **Zone A** and **Zone B**

**Other local community members** : access - **Zone C**

## C. Monitoring Scheme



### POPULATION PARAMETERS:

#### • Growth

In pens (single batch)

Entire sea ranch (multiple batches)

- average weight over time
- modal progression of length converted to weight frequency distributions ( FISATII 2000)

#### • Survival rate (%Sur)

$$\%Sur = Ab_{tot} / RH_{tot}$$

where  $Ab_{tot}$  = total  $Ab$  in sea ranch

$RH_{tot}$  = total # released juveniles

Zones	Area (m <sup>2</sup> )	Surveyed area (m <sup>2</sup> )
Monitoring pens	300 (3 x 100m <sup>2</sup> )	300 (100%)
A – Core release	2,200 (50m x 50m)	360 (16.4%)
B – Nursery	7,500 (100m x 100m)	1,600 (21.3%)
C – Buffer	40,000 (250m x 250m)	1,600 (4%)
D – Outside	---	1,600 (n/a)

#### • Population density ( $D_z$ )

in individuals per square meter

$$D_z = n_z / a_z$$

where  $n_z$  = number of samples in a zone

$a_z$  = total area (m<sup>2</sup>) surveyed in a zone

#### • Estimated Abundance ( $Ab_{tot}$ )

in number of individuals

$$Ab_z = D_z * A_z$$

where

$D_z$  = population density

$A_z$  = total area (m<sup>2</sup>) of zone

$$Ab_{tot} = \text{sum of } Ab_z$$

#### • Biomass (kg ha<sup>-1</sup>)

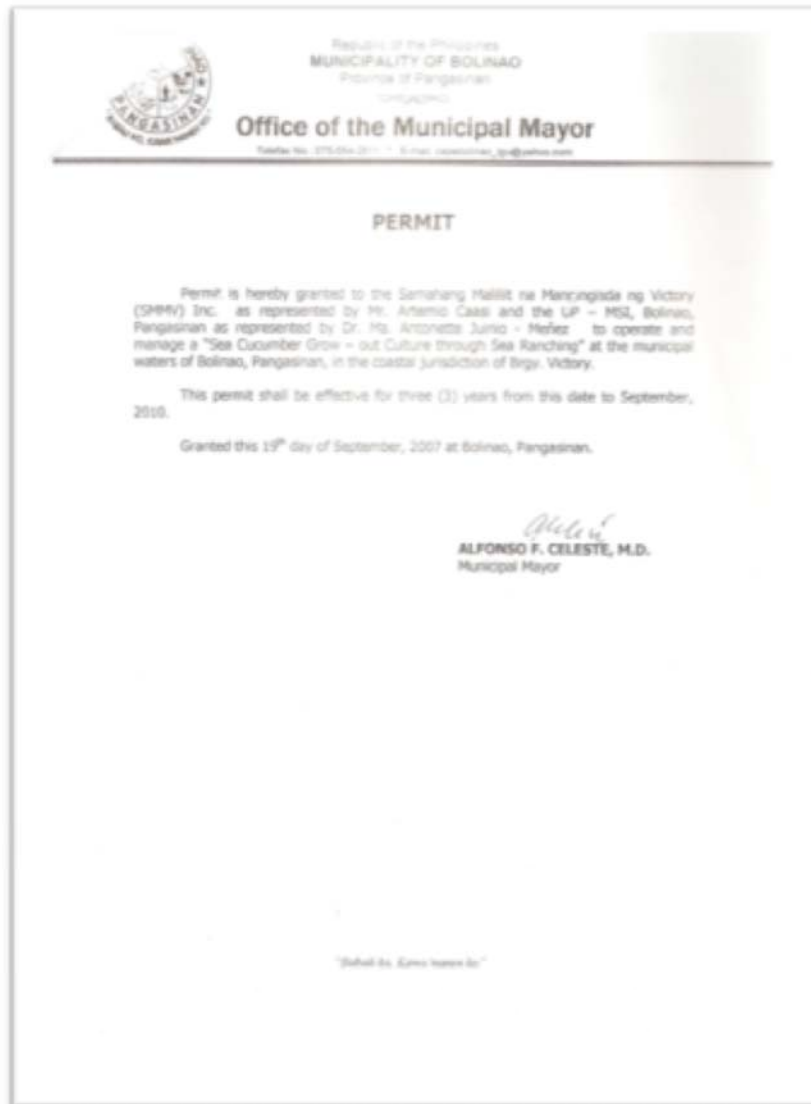
$$B_{tot} = (\text{sum of } Ab_c * W_c / 5) / 1000$$

where  $Ab_c$  - number of individuals per size class

$W_c$  - mid weight of size class (g)



# First Sea Ranching Site: Brgy. Victory, Bolinao, Pangasinan



(e.g. MPA; mangrove reforestation; culture of sea urchins, seaweeds and grouper)



**Signing of partnership agreement: December 6, 2007**

**Total juvenile released: 24,175**

**Year 1 = 5,011 (Dec 2007-June 2008)**

**Year 2 = 11,106 (Sept 2008 – Apr 2009)**

**Year 3 = 9,313 (Jan-Jul, 2010)**

**Year 4 = 600 (Nov, 2010)**

**No. of monitoring surveys conducted: 11**

Results

## Second Sea Ranching Site: Brgy. Sablig, Anda, Pangasinan



Signing of partnership agreement: February 5, 2009

**Total juvenile released: 20, 548**

**Year 1 = 5,613 (Dec 2008 – Apr 2009)**

**Year 2 = 14,935 (July 2009-Apr 2010)**

**Year 3 = 4,723 (Nov-Dec, 2010)**

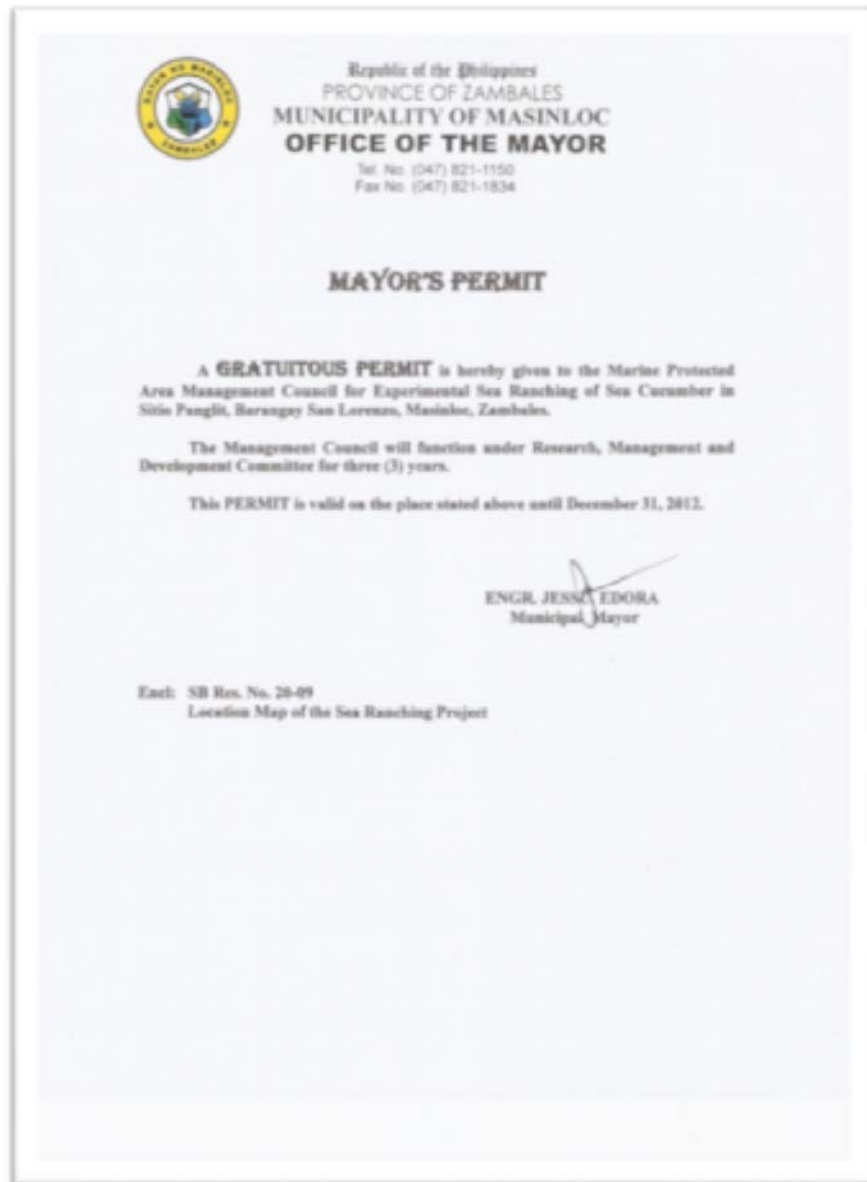
**No. of monitoring surveys conducted: 7**

Excellent track record in mangrove  
rehabilitation, seaweed culture, grouper culture,  
& Marine Protected Area

Results



## Third Sea Ranching Site: Sitio Panglit, Masinloc, Zambales



**Signing of partnership agreement: May 13, 2009**

**Total juvenile released: 22,472**

**Year 1 = 3,275 (May 2009)**

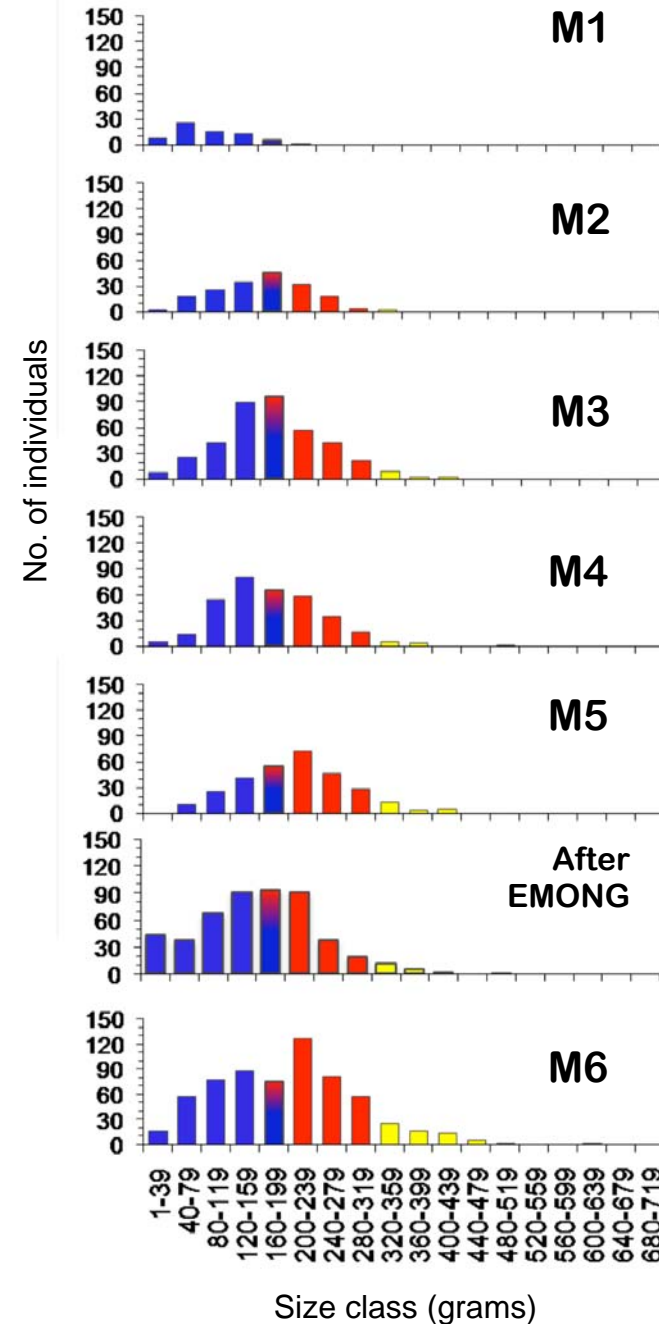
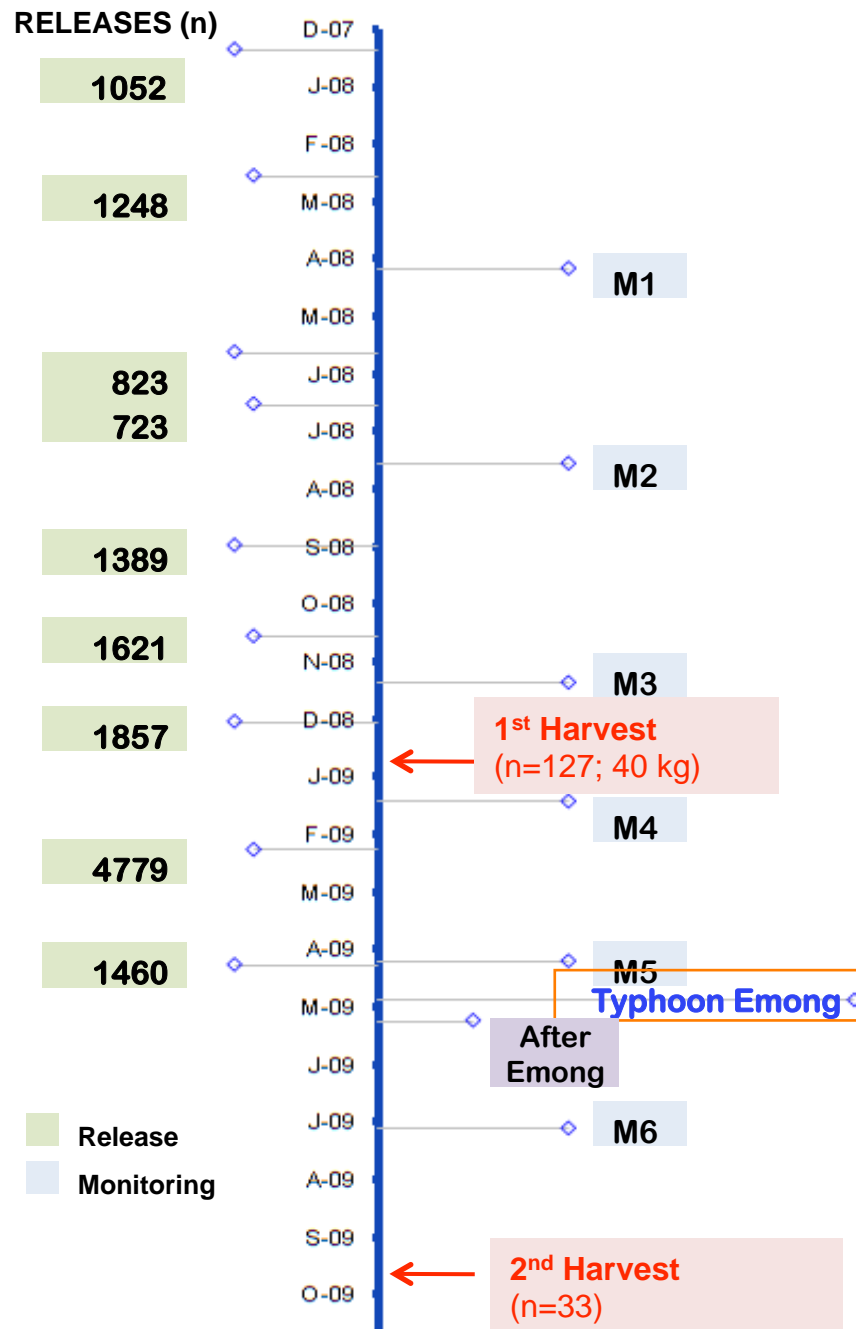
**Year 2 = 19,197 (Jun 2009-Apr 2010)**

**No. of monitoring surveys conducted: 6**

Results

Actively participating in community-based resource management (Marine Protected Area Managers)

# Timele of activities in the Bolinao Sea Ranching Site



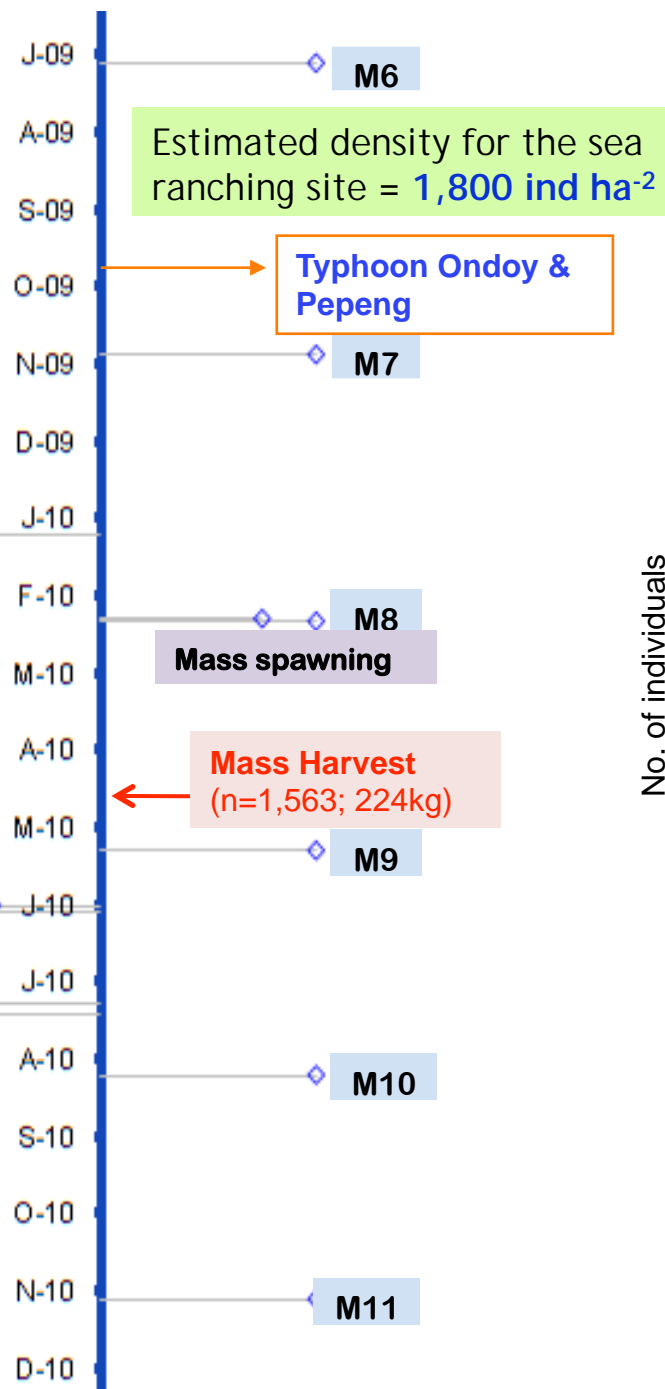
RELEASES (n)

600

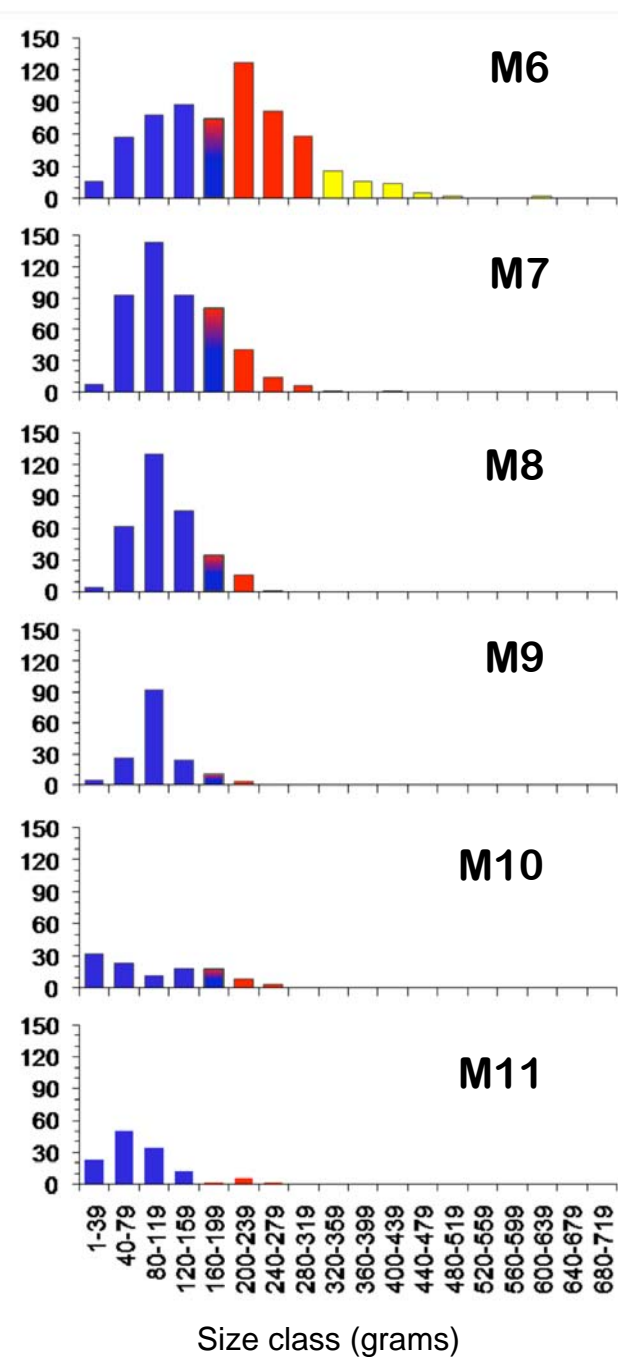
1958  
1150

4350  
1255

Releases  
Monitoring



No. of individuals



Results



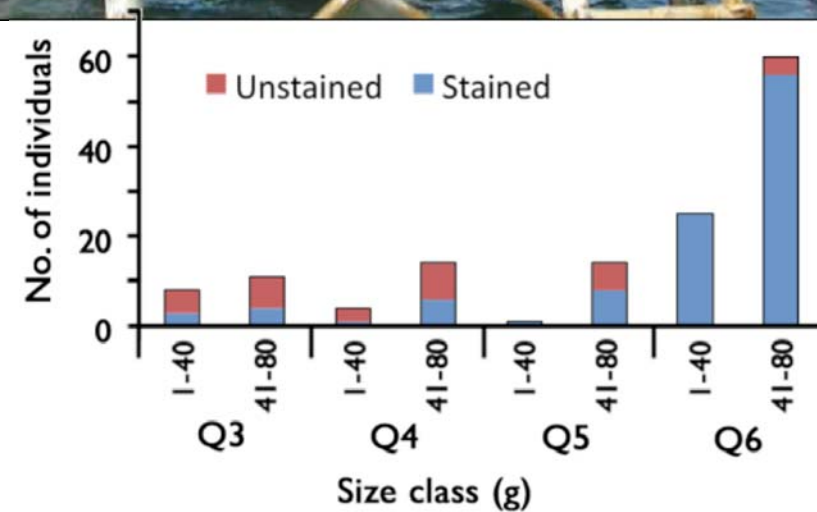
# Ecological Benefits

## Spawning

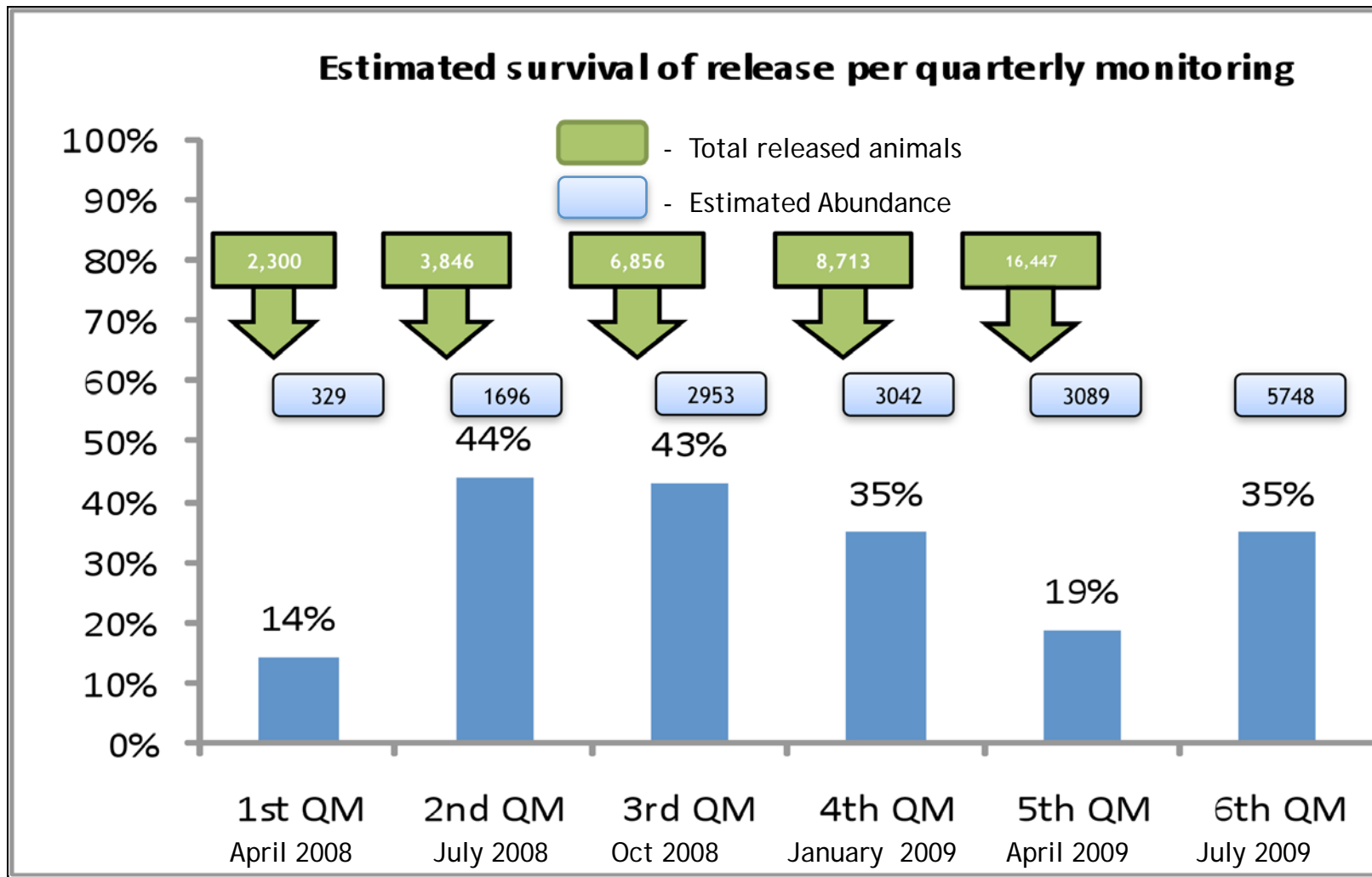


**19.7% (38 out of 181) adults observed**

(Olavides et al., 2011)



# Survival





## Visitors from all over the country

### **LUZON:**

- Ilocos Norte
- Tuguegarao City
- Aparri, Cagayan
- San Fernando, La Union
- Pangasinan
- Zambales
- Marinduque
- Ilocos Sur
- Camarines Norte

### **VISAYAS:**

- Tigbauan, Iloilo
- Bantayan Island
- Tacloban
- Bohol
- Antique
- Eastern Samar

### **MINDANAO:**

- Davao City
- Davao Oriental
- Tawi-Tawi
- Cagayan de Oro City



# Maraming Salamat!



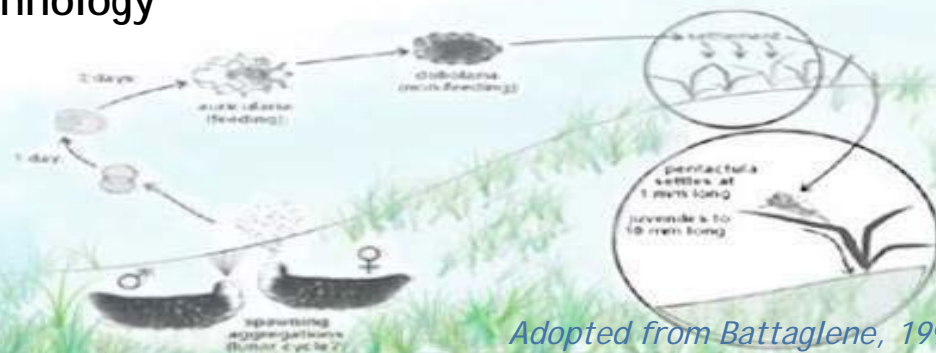
University of the Philippines  
Marine Science Institute



Australian Center for  
International Agriculture  
Research



Department of Science and  
Technology



*Adopted from Battaglene, 1999*