# ISPM

# Contents

| Peces                                  | 2  |
|----------------------------------------|----|
| Estructura comunitaria                 | 2  |
| Densidad promedio por zona             |    |
| Riqueza promedio por zona              |    |
| Biomasa promedio por zona              |    |
| Nivel trófico promedio por zona        |    |
| Proporciones de Nivel Trófico en Peces |    |
| Invertebrados                          | 9  |
| Estructura comunitaria                 | 9  |
| Densidad promedio por zona             |    |
| Riqueza promedio por zona              |    |
| Especies objetivo de RBISPM            | 3  |
| Mycteroperca jordani                   | 13 |
| Mycteroperca prionura                  | 13 |
| Mycteroperca rosacea                   |    |
| Lutjanus argentiventris                |    |
| Hoplopagrus guntherii                  |    |
| Scarus ghobban                         |    |

## Peces

#### Estructura comunitaria

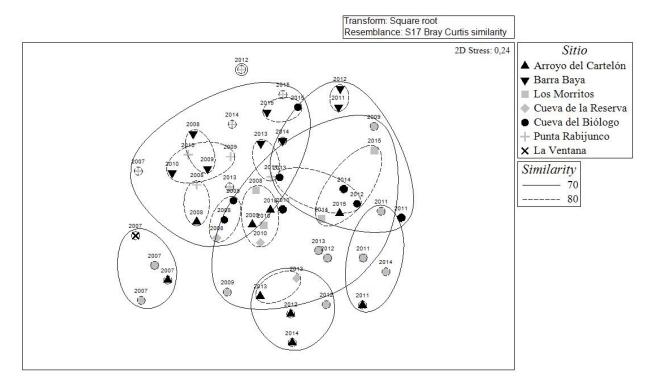
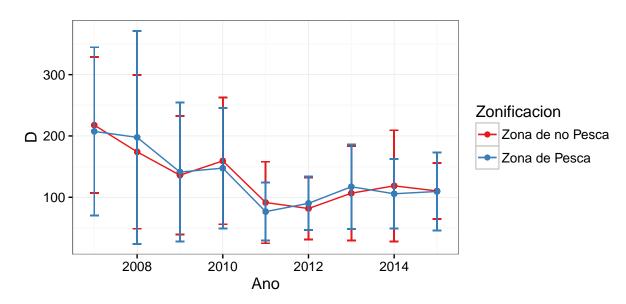


Figure 1: Escalamiento multidimensional no métrico para peces. Los marcadores en negro y gris representan zonas de pesca y no pesca, respectivamente.

### Densidad promedio por zona



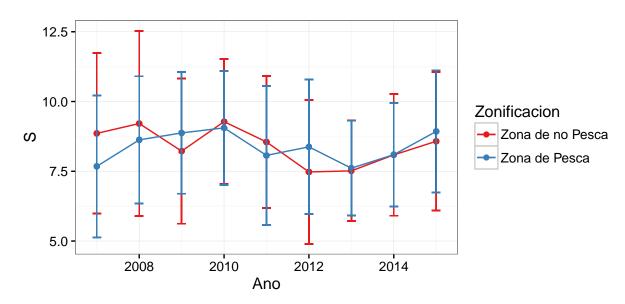
% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:14

Table 1: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                         | Densidad (orgs / transecto) |                          |                             |
|-------------------------|-----------------------------|--------------------------|-----------------------------|
|                         | N                           |                          |                             |
|                         | Pesca                       | Reserva                  |                             |
|                         | (1)                         | (2)                      | (3)                         |
| Año                     | -12.889                     | -12.207                  | -15.905                     |
|                         | t = -3.249**                | $t = -3.125^{**}$        | $t = -5.903^{***}$          |
| Zonificacion            |                             |                          | -8.412                      |
|                         |                             |                          | t = -2.266**                |
| Temperatura             | 26,053.270                  | 24,681.770               | 32,296.540                  |
|                         | t = 3.266**                 | $t = 3.142^{**}$         | $t = 5.922^{***}$           |
| $R^2$                   | 0.601                       | 0.583                    | 0.714                       |
| Adjusted R <sup>2</sup> | 0.544                       | 0.523                    | 0.673                       |
| Residual Std. Error     | 30.727 (df = 7)             | 30.256 (df = 7)          | 25.449 (df = 14)            |
| F Statistic             | $10.558^{**} (df = 1; 7)$   | $9.767^{**} (df = 1; 7)$ | $17.486^{***} (df = 2; 14)$ |
|                         | ·                           |                          |                             |

*Note:* \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

### Riqueza promedio por zona



% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:24

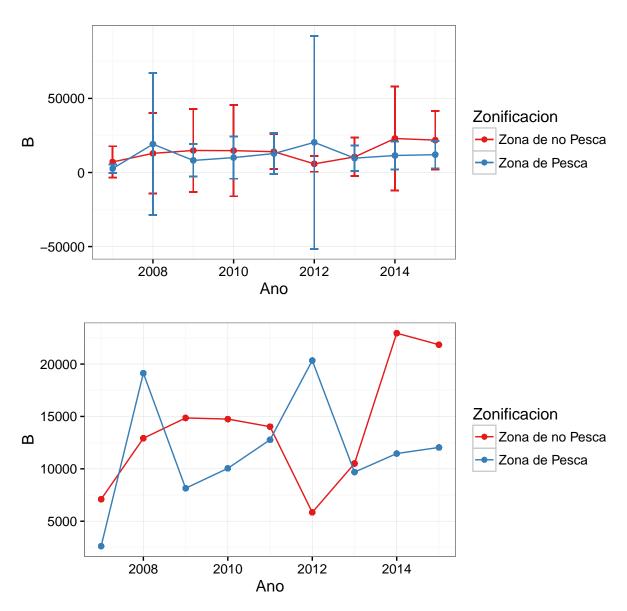
Table 2: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                                | Riqueza (s / transecto) S Pesca Reserva |            |
|--------------------------------|-----------------------------------------|------------|
|                                |                                         |            |
|                                |                                         |            |
|                                | (1)                                     | (2)        |
| Año                            | 0.003                                   | -0.129     |
|                                | t = 0.046                               | t = -1.680 |
| Constant                       | 1.442                                   | 267.160    |
|                                | t = 0.010                               | t = 1.735  |
| $\mathbb{R}^2$                 | 0.0003                                  | 0.287      |
| Adjusted R <sup>2</sup>        | -0.143                                  | 0.186      |
| Residual Std. Error $(df = 7)$ | 0.576                                   | 0.593      |
| F Statistic (df = $1; 7$ )     | 0.002                                   | 2.823      |
| Note:                          | *n<0.1. **n<0.05. ***n<0.01             |            |

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

### Biomasa promedio por zona



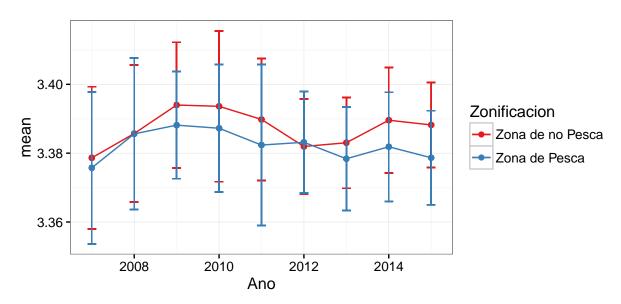
% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:33

Table 3: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                                | Biomasa (grs) B                     |                                       |
|--------------------------------|-------------------------------------|---------------------------------------|
|                                |                                     |                                       |
|                                | Pesca                               | Reserva                               |
|                                | (1)                                 | (2)                                   |
| Año                            | 467.307                             | 1,191.358                             |
| Constant                       | t = 0.646  -927,948.900  t = -0.638 | t = 1.794  -2,381,956.000  t = -1.784 |
| Adjusted R <sup>2</sup>        | -0.079                              | 0.217                                 |
| Residual Std. Error $(df = 7)$ | 5,604.198                           | 5,143.631                             |
| F Statistic (df = $1; 7$ )     | 0.417                               | 3.219                                 |
| Note:                          | *p<0.1; **p<0.05; ***p<0.01         |                                       |

6

### Nivel trófico promedio por zona



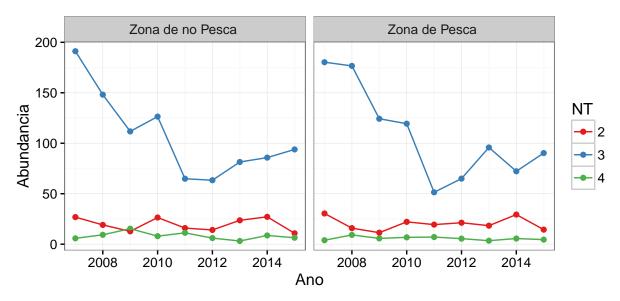
% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:40

Table 4: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                                | Nivel Trófico<br>NT               |                                |
|--------------------------------|-----------------------------------|--------------------------------|
|                                |                                   |                                |
|                                | Pesca                             | Reserva                        |
|                                | (1)                               | (2)                            |
| Año                            | -0.0004                           | 0.0003                         |
| Constant                       | t = -0.685 $4.157$ $t = 3.674***$ | t = 0.377 $2.842$ $t = 1.968*$ |
| Adjusted R <sup>2</sup>        | -0.071                            | -0.120                         |
| Residual Std. Error $(df = 7)$ | 0.004                             | 0.006                          |
| F Statistic (df = $1; 7$ )     | 0.469                             | 0.142                          |
| Note:                          | *n<0.1: **n<0.05: ***n<0.01       |                                |

*Note:* 

### Proporciones de Nivel Trófico en Peces



Pearson's Chi-squared test

data: pro.NT\_P X-squared = 0.38274, df = 16, p-value = 1

Pearson's Chi-squared test

data: pro.NT\_R X-squared = 0.29691, df = 16, p-value = 1

### Invertebrados

#### Estructura comunitaria

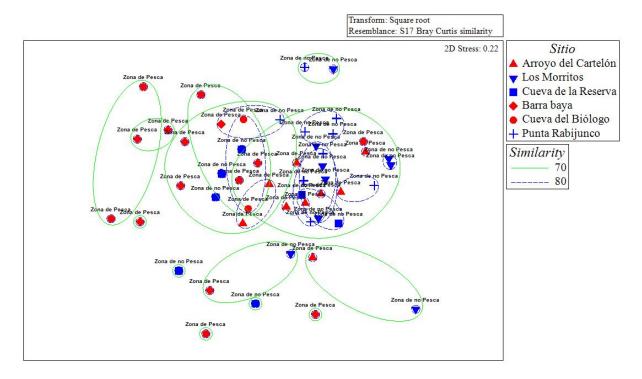
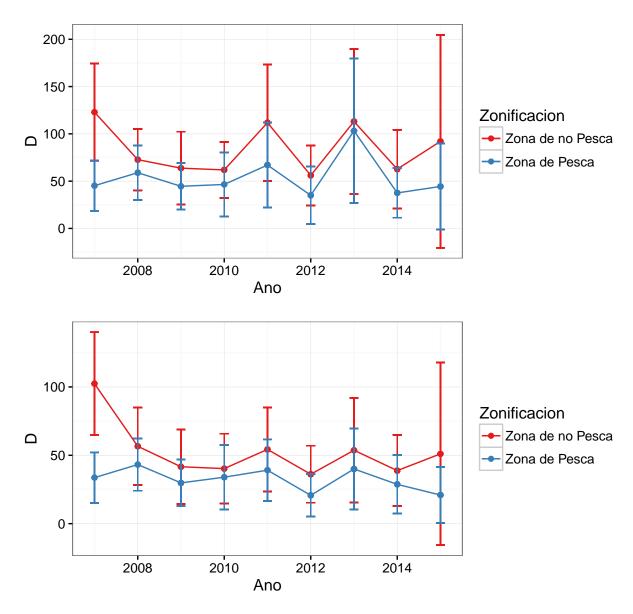


Figure 2: Escalamiento multidimensional no métrico para invertebrados. Los marcadores rojos y azules representan zonas de pesca y no pesca, respectivamente.

## Densidad promedio por zona

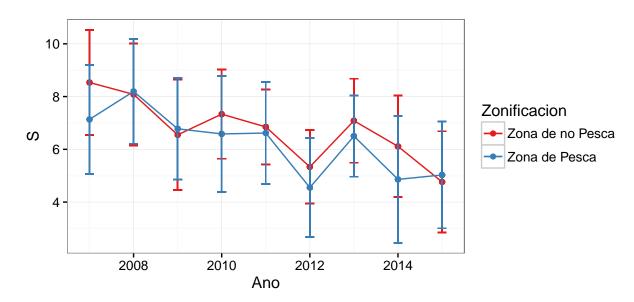


% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:55

Table 5: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                                | Densidad (org / transecto)  N |                           |
|--------------------------------|-------------------------------|---------------------------|
|                                |                               |                           |
|                                | Pesca                         | Reserva                   |
|                                | (1)                           | (2)                       |
| Año                            | 0.640                         | -1.013                    |
| Constant                       | $t = 0.220 \\ -1,232.770$     | $t = -0.282 \\ 2,120.260$ |
|                                | t = -0.211                    | t = 0.294                 |
| Adjusted $R^2$                 | -0.135                        | -0.130                    |
| Residual Std. Error $(df = 7)$ | 22.482                        | 27.773                    |
| F Statistic (df = $1; 7$ )     | 0.049                         | 0.080                     |
| Note:                          | *p<0.1; **p<0.05; ***p<0.01   |                           |

### Riqueza promedio por zona



% Table created by stargazer v.5.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harvard.edu % Date and time: vi., ago. 19, 2016 - 12:14:59

Table 6: Modelos lineales describiendo cambios en las densidades promedio por zona.

|                                | Riqueza S                      |                    |
|--------------------------------|--------------------------------|--------------------|
|                                |                                |                    |
|                                | Pesca                          | Reserva            |
|                                | (1)                            | (2)                |
| Año                            | -0.350                         | -0.365             |
|                                | $t = -3.543^{***}$             | $t = -3.838^{***}$ |
| Constant                       | 710.537                        | 741.466            |
|                                | t = 3.574***                   | t = 3.873***       |
| Adjusted $R^2$                 | 0.591                          | 0.632              |
| Residual Std. Error $(df = 7)$ | 0.766                          | 0.737              |
| F Statistic (df = $1; 7$ )     | 12.552***                      | 14.731***          |
| Notes                          | *n <0 1. **n <0 05. ***n <0 01 |                    |

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

# Especies objetivo de RBISPM

Mycteroperca jordani

Mycteroperca prionura

Mycteroperca rosacea

Lutjanus argentiventris

Hoplopagrus guntherii

Scarus ghobban