

# Tropicalization strengthens consumer pressure on habitat-forming seaweeds

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## Supplementary Material

Table S1. Documented species of temperate/subtropical and tropical herbivorous fish that consume kelp in different parts of the world. Consumption is reported as not mentioned (n/a), grams per day (g/d), bites per hour ( $b\ h^{-1}$ ), percentage of stomach content (%), percentage of length (%L) and percentage of area (%A). Analysis of herbivory was reported as anecdotal (Anec), observational (Obs), feeding rate in laboratory (Lexp) or fieldwork (Fexp) and Stomach content (StCn).

| TEMPERATE            |   |   |                            |          |                                |
|----------------------|---|---|----------------------------|----------|--------------------------------|
| Location             | Consumer  | Kelp  | Consumption                | Analysis | Reference                      |
| USA, California      | <i>Girella nigricans</i><br><i>Medialuna californiensis</i>                               | <i>Macrocystis</i><br>and<br><i>Pterygophora</i>              | n/a                        | Anec     | Harris et al. 1984             |
| Spain, North         | <i>Sarpa salpa</i><br><i>Boops boops</i>  | <i>Undaria pinnatifida</i> and<br><i>Saccharina latissima</i> | n/a                        | Obs      | Peteiro and Freire 2012        |
| Japan, South         | <i>Calotomus japonicus</i><br><i>Prionurus Scalprum</i><br><i>Stephanolepis cirrhifer</i> | <i>Ecklonia kurome</i>  | 131 g/d<br>3 g/d<br>19 g/d | Lexp     | Kiryama et al 2001             |
| Australia, Southeast | <i>Olisthops cyanomelas</i>   | <i>Ecklonia radiata</i>                                       | 99 %                       | StCn     | Andrew and Jones 1990          |
| Australia, South     | Syn. <i>Caranx cyanomelas</i>   |   | 1 – 99 %                   | StCn     | Shepherd and Baker 2008        |
| New Zealand          | <i>Aplodactylus arctidens</i>   | <i>Ecklonia radiata</i>                                       | 0.4 – 2.1 %                | StCn     | Choat and Clements 1992        |
|                      | <i>Girella tricuspidata</i>   |   | 5.4 %                      |          |                                |
|                      | <i>Girella elevata</i>  |   | 3.7 – 14.7 %               | StCn     | Clements and Choat 1997        |
|                      | <i>Kyphosus sydneyanus</i>  |   | 17 – 52 %                  | StCn     | Moran and Clements 2002        |
|                      | <i>Odax cyanoallix</i>  |   | 6.8 – 84 %                 | StCn     | Zemke- White and Clements 2004 |
|                      | <i>Odax pullus</i>  |   | 1 – 70 %                   | StCn     | Clements and Choat 1993        |
|                      |   | <i>Lessonia variegata</i>                                     | 57 - 76 %                  | StCn     | Choat and Clements 1992        |

**TROPICAL**

| Location          | Consumer   | Kelp  | Consumption   | Analysis     | Reference   |
|-------------------|--|---|---|--------------|---|
| Japan             | Parrotfish (no id)   | <i>Ecklonia sp.</i>   | n/a   | Obs          | Hasegawa 2010   |
|                   | <i>Calotomus japonicus</i>   | <i>Ecklonia kurome</i>  | 131 g/d   | Lexp         | Kiriyama et al 2001   |
|                   | <i>Thamnaconus modestus</i>  |   | 19 g/d  |              |   |
|                   | <i>Kyphosus vaigiensis</i> syn. <i>K. lembus</i>                                 |   | 51 g/d  |              |   |
|                   | <i>Kyphosus bigibbus</i>   | <i>Ecklonia radiata</i>                                       | < 1 %   | StCn         | Clements and Zemke-White 2008   |
|                   | <i>Kyphosus bigibbus</i>   | <i>Eckloniopsis radicata</i> and <i>Undaria pinnatatifida</i> | 0 – 60 %  | StCn         | Yatsuya et al 2015  |
|                   | <i>Siganus fuscescens</i>  | <i>Ecklonia cava</i>  | 29 – 100 %L   | Fexp         | Hasegawa 2010   |
|                   |  | <i>Ecklonia cava</i> , <i>Eisenia arborea</i>                 | 0 – 100 %A  | Fexp         | Nimura et al. 2007  |
|                   |  | <i>Ecklonia kurome</i>  | 76 g/d  | Lexp         | Kiriyama et al 2001   |
| Mediterranean Sea | <i>Siganus luridus</i><br><i>Siganus rivulatus</i>                               | Non-kelp<br><i>Macroalgae</i>                                 |   | StCn<br>Fexp | Azzurro et al. 2007;<br>Bariche et al 2009<br>Sala et al. 2011; Vergés,<br>Tomas, et al. 2014 |
| Chile             | <i>Aplocactylus punctatus</i>  | <i>Lessonia trabeculata</i>                                   | 13 – 49 %   | StCn         | Caceres et al 1994  |
| Australia, West   | <i>Kyphosus bigibbus</i><br><i>Kyphosus gladius</i><br><i>Siganus fuscescens</i> | <i>Ecklonia radiata</i>                                       | 3103 ± 1925 b h <sup>-1</sup><br>173 ± 101 b h <sup>-1</sup><br>98 ± 20 b h <sup>-1</sup> | Fexp         | Bennett et al. 2015   |
| Australia, East   | <i>Siganus fuscescens</i><br><i>Kyphosus bigibbus</i>                            | <i>Ecklonia radiata</i>                                       | >300 b h <sup>-1</sup><br>>300 b h <sup>-1</sup>  |              | Verges et al. 2016  |
| New Zealand       | <i>Kyphosus bigibbus</i>   | <i>Ecklonia radiata</i>                                       | <1 %  | StCn         | Clements and Zemke-White 2008   |

Table S1 References:

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