The following supplement accompanies the article

Zooplanktivory is a key process for fish production on a coastal artificial reef

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Supplement.

The Calculation of Prey Size Selection

To account for the visual acuity of zooplanktivorous fishes affecting patterns of prey size-selection by limiting their detection of small items (O'Brien 1979, Wankowski 1979, Li et al. 1985) the selection of *Atypichthys strigatus* for different size prey items was calculated as:

$$\begin{aligned} Sel_i &= \frac{P_i}{P_{\max}} \text{ when } P_i < P_{\max} \\ &= 1 \text{ when } P_i \geq P_{\max} \end{aligned} \tag{S1}$$

where Sel_i is the observed prey size-selection by *A. strigatus* for a zooplankton size class i, P_i is the proportion by count of a zooplankton size class i observed within the stomachs of *A. strigatus*, and $P_{\max}$ is the largest proportion of a single zooplankton size class (Fig. S3A). For size classes larger than that at $P_{\max}$, the pattern of prey size-selection was assumed equal (i.e. consumption was in proportion to environmental supply). The decline in selection for zooplankton size classes smaller than that at $P_{\max}$ is likely to reflect a decline in catchability by *A. strigatus*, as zooplankton was observed to be most abundant in smaller size classes (Fig. S3A). The Sel_i values for the 9 size bins in order of ascending size were: 0, 0.02, 0.46, 1, 1, 1, 1, 1, 1.

Given that not all zooplankton size classes were consumed in proportion to their supply, the total biomass of zooplankton estimated from the laser optical plankton counter (LOPC) would overestimate the biomass available to *A. strigatus*. Thus, selection by *A. strigatus* for different sized prey previously estimated (Sel_i) was combined with total zooplankton biomass data from the LOPC to estimate the available biomass:

$$Ba_i = Sel_i \times Bb_i \quad \text{(S2)}$$

where Ba_i is the zooplankton biomass (mg m^{-3}) of size class *i* that is available to *A. strigatus* based on observed prey size-selection (Sel_i) and Bb_i is the total zooplankton biomass (mg m^{-3}) in size class *i* before predation at the reef. The Bb_i values were approximated using a log-normal distribution (Table 1 in the main article), with the following parameters (mean μ_i, standard deviation σ_i) for the 9 size bins in ascending size order (derived from raw data): ln(11.2), 0.5; ln(104.9), 0.6; ln(221.1), 0.5; ln(197.1), 0.4; ln(100.2), 0.35; ln(53.2), 0.35; ln(38.6), 0.35; ln(31.0), 0.25; ln(113.7), 0.35.

SUPPLEMENT LITERATURE CITED

Li KT, Wetterer JK, Hairston Jr. NG (1985) Fish size, visual resolution, and prey selectivity. Ecology 66:1729-1735

O'Brien WJ (1979) The predator-prey interaction of planktivorous fish and zooplankton. Am Scit 67:572-581

Wankowski JWJ (1979) Morphological limitations, prey size selectivity, and growth response of juvenile atlantic salmon, *Salmo salar*. J Fish Biol 14:89-100

SUPPLEMENT FIGURES

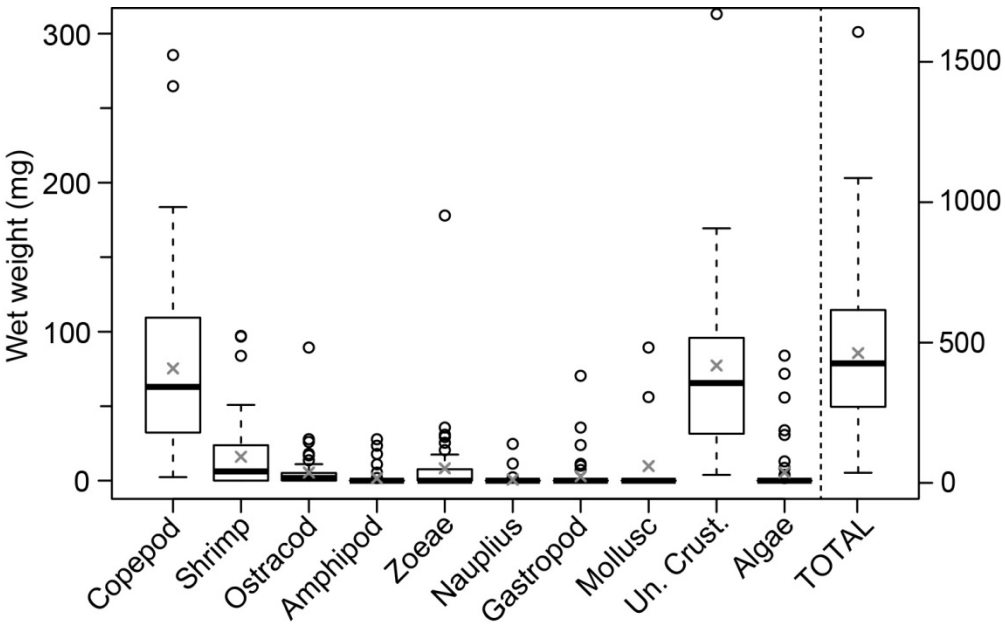

Fig. S1. Quantile boxplots of wet weight (mg; left axis) of *A. strigatus* stomach contents (n = 55), including unidentified crustacean (Un. Crust.). The 'Unidentifiable' group (Table 2) is included in total wet weight of all contents (mg; right axis) but not reported as an individual prey group. Grey crosses denote mean values

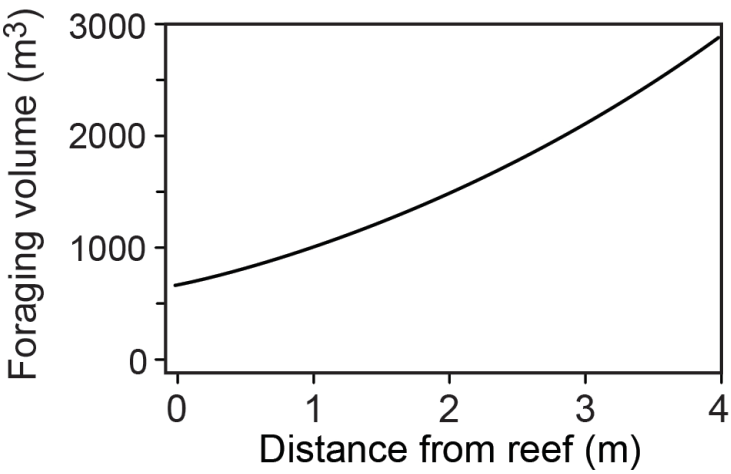

Fig. S2. Relationship between foraging distance from the reef and the volume (m^3) of water available to be foraged (here reef volume is included in foraging volume). The volumes (V_p; m^3) for the 9 foraging bins (p) were 664 (within reef), 151 (0–0.5 m), 188 (0.5–1 m), 232 (1–1.5 m), 282 (1.5–2 m), 249 (2–2.5 m), 328 (2.5–3 m), 371 (3–3.5 m), 417 (3.5–4 m)

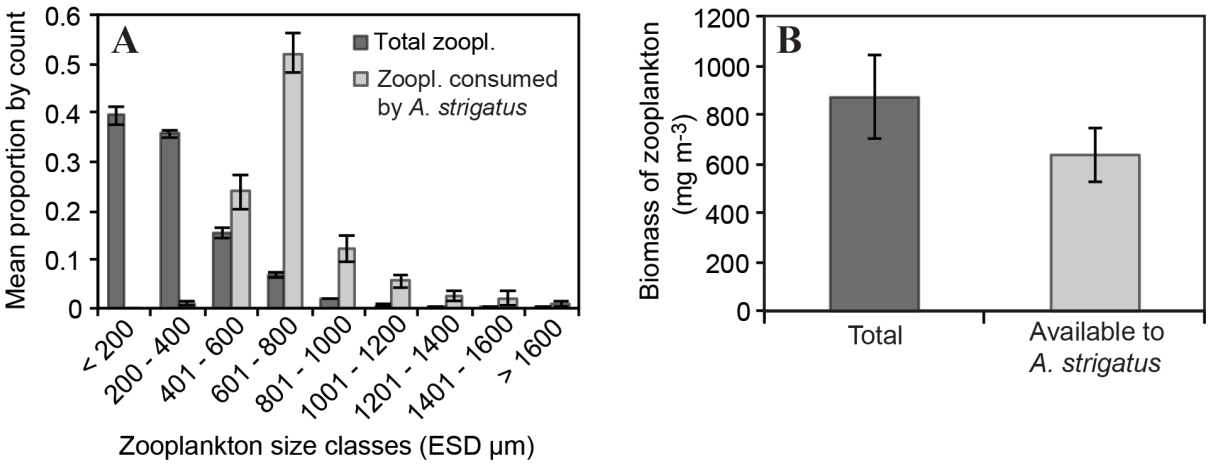

Fig. S3. (A) Size distribution of total zooplankton assemblage sampled (dark grey; n = 27 plankton tows) and size-specific zooplankton consumed by *A. strigatus* at the artificial reef (light grey; n = 55). (B) Biomass of the total zooplankton assemblage at the artificial reef, and the biomass available to *A. strigatus* given the pattern of prey size-selection observed in (A). Error bars are ± 1 SE. ESD: equivalent spherical diameter

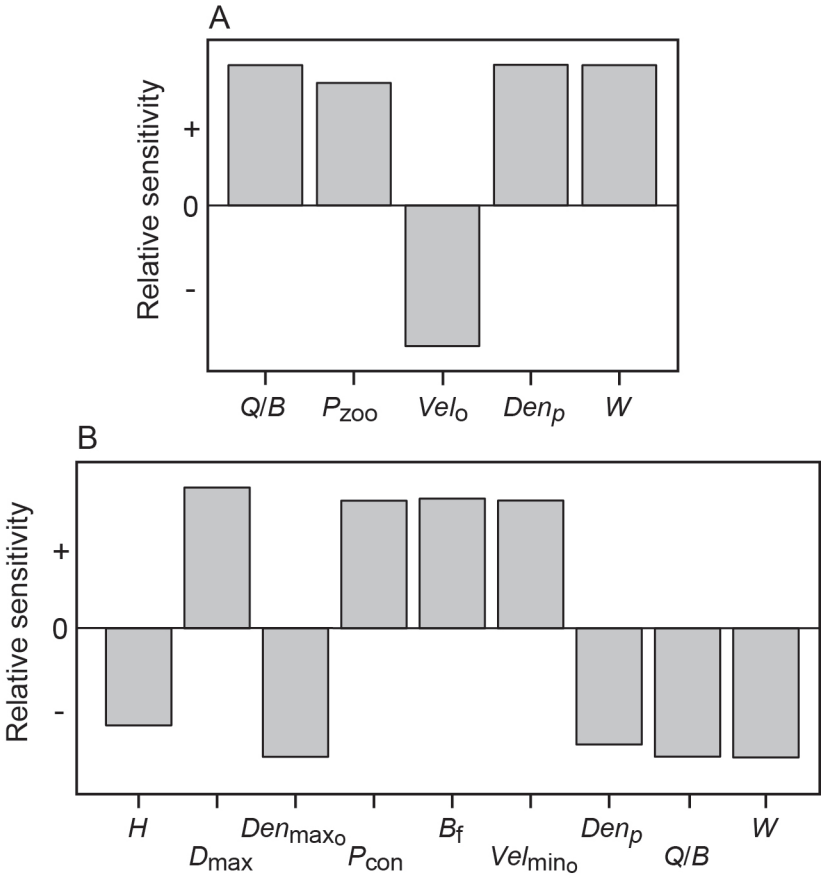

Fig. S4. Results of the sensitivity analyses, for Model 1 (A) and Model 2 (B). The 2 response variables were % depletion of total zooplankton biomass (A); and the reef length (m) at which the food supplied:food required ratio = 1 (B). See Table 1 in main article for parameter information