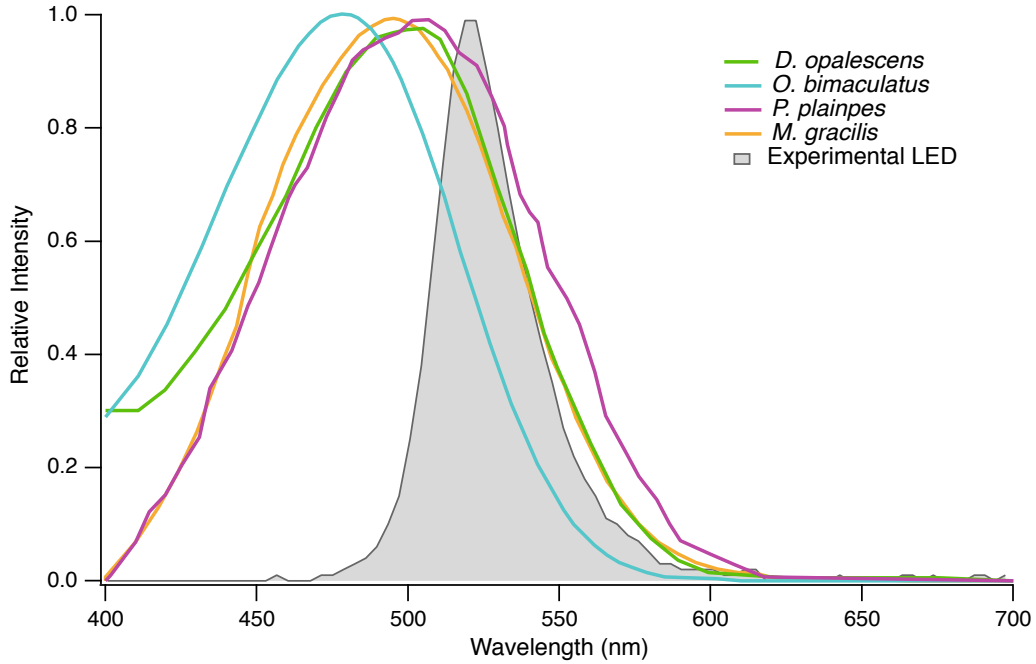

Fig S1. Comparison of experimental light and spectral sensitivities of each species.
Estimated spectral sensitivities of the market squid, *Doryteuthis opalescens* (green line); the octopus, *Octopus bimaculatus* (teal line); the tuna crab, *Pleuroncodes planipes* (magenta line); and the graceful rock crab, *M. gracilis* (orange line), in comparison to the spectrum of the green LED (gray line and shading) used in all experiments (525 nm, 35 nm FWHM; Thorlabs). Data for spectral sensitivities were obtained or modified from existing literature for the same species, or a taxonomically related species with similar life history and habitat depth: *D. opalescens* from sensitivity of *Doryteuthis pealeii* (Hubbard et al., 1959); *O. bimaculatus* from sensitivity of *O. vulgaris* (Brown and Brown, 1958); *P. planipes* (Fernandez, 1973); and *M. gracilis* from *Cancer irroratus* (Cronin and Forward, 1988). These spectra were used to determine the species-specific photon flux density.

Table S1. Statistical results of response-irradiance relationships.

Statistical comparisons of light series tests (Figs. 4, 5) conducted on the larvae of the market squid, *D. opalescens* (green); the octopus, *O. bimaculatus* (teal); the tuna crab, *P. planipes* (magenta); and the graceful rock crab, *M. gracilis* (orange). Differences between visual responses at three oxygen conditions (normoxia, ~22 kPa/~265 μmol kg^{-1}; intermediate reduction of pO_2, ~6.5 kPa/~95 μmol kg^{-1}; and low pO_2, ~3.5 kPa/~55 μmol kg^{-1}) at each experimental irradiance [in species-specific photon flux density (μmol photons m^{-2} s^{-1})] were determined using Kruskal-Wallis tests in each species. Results are presented for the light series visual responses normalized to both the maximum value of normoxia ("Normalized to normoxia"; Fig. 4) and the maximum value within each oxygen condition ("Normalized within each condition"; Fig 5). Significant values ($p < 0.05$) are presented in bold. Abbreviations: df = degrees of freedom; NA = not applicable; PFD = photon flux density.

df = 2		Squid PFD	0.033	0.296	0.557	0.815	1.073	1.327	1.581	1.834	2.087
D. opalescens	Normalized to normoxia	Chi squared	2.808	8.000	8.769	8.000	8.000	8.346	8.346	8.346	8.649
		p-value	0.246	**0.018**	**0.012**	**0.018**	**0.018**	**0.015**	**0.015**	**0.015**	**0.013**
	Normalized within each condition	Chi squared	1.423	4.154	3.846	1.654	4.962	2.808	0.269	3.039	NA
		p-value	0.491	0.125	0.146	0.437	0.084	0.246	0.874	0.219	NA
df = 2		Octopus PFD	0.024	0.209	0.393	0.576	0.758	0.938	1.117	1.296	1.474
O. bimaculatus	Normalized to normoxia	Chi squared	2.400	6.489	7.200	6.489	6.489	6.489	6.489	6.489	6.713
		p-value	0.301	**0.039**	**0.027**	**0.039**	**0.039**	**0.039**	**0.039**	**0.039**	**0.035**
	Normalized within each condition	Chi squared	5.067	2.222	5.067	5.600	4.267	2.756	5.689	1.689	NA
		p-value	0.079	0.329	0.079	0.061	0.118	0.252	0.058	0.430	NA
df = 2		Tuna Crab PFD	0.036	0.323	0.608	0.891	1.173	1.450	1.727	2.004	2.280
P. planipes	Normalized to normoxia	Chi squared	4.500	6.731	5.654	6.269	6.000	6.731	6.000	7.731	8.290
		p-value	0.105	**0.035**	0.059	**0.044**	**0.050**	**0.035**	**0.050**	**0.021**	**0.016**
	Normalized within each condition	Chi squared	1.500	0.269	1.192	3.136	0.615	0.115	0.154	1.631	NA
		p-value	0.472	0.874	0.551	0.209	0.735	0.944	0.926	0.443	NA
df = 2		Crab PFD	0.032	0.288	0.542	0.794	1.045	1.292	1.539	1.786	2.031
M. gracilis	Normalized to normoxia	Chi squared	12.737	15.431	14.794	14.500	14.500	14.222	14.222	14.500	14.005
		p-value	**0.002**	**0.000**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
	Normalized within each condition	Chi squared	4.774	1.433	2.151	0.693	2.821	0.693	3.468	2.331	NA
		p-value	0.092	0.488	0.341	0.707	0.244	0.707	0.177	0.312	NA