Appendix A: Supplementary material and data

A.S.1: Materials and methods: DA measurements and isotope analysis

Approximately 1 gram of unrinsed tissue (to prevent loss of DA because this phycotoxin is water soluble) was combined with 10 mL of 50% methanol. The supernatant from chemical extractions was separated through a 0.2 ⌈m filter and stored at -20°C. To quantify trace levels of DA, the supernatant was processed in a high performance liquid chromatography mass spectrometer (Agilent Technologies 1290 Infinity II 6150 Quadrupole LC/MS) at UCSC, following standard protocols (Mekebri et al., 2009; Peacock et al., 2018).

Tissues separated for bulk isotope analysis were lyophilized and homogenized into fine powder. To preserve the natural abundances of C and N, and avoid biased trophic links, lipids were not extracted (Murry et al., 2006). C:N ratios were obtained in case the effect of lipid content on C fractionation needed to be corrected (McConnaughey and McRoy, 1979). A total of 1.1 – 1.5 mg of homogenized tissue were weighed into tin capsules. Sample materials were analyzed for bulk analysis at the UC-Davis Stable Isotope Facility using an ANCA-GSL elemental analyzer and PDZ Europe 20-20 isotope ratio mass spectrometer. Isotope compositions are expressed with a δ-notation:

$$\delta\,{}^{H}X = [(({}^{H}X/{}^{L}X)_{sample} - ({}^{H}X/{}^{L}X)_{standard} / ({}^{H}X/{}^{L}X)_{standard})] * 1000,$$

where X is C or N, H is the heavy isotope (^{13}C or ^{15}N), and L is the lighter isotope (^{12}C or ^{13}N). International standards (Pee Dee Belemnite for C and atmospheric N_2 for nitrogen) are applied and results are expressed as ‰.

A.T1: All species collected for isotope analysis and DA measurements organized by taxonomic group. Collection method specifies how specimens were obtained: coastline indicates specimens collected at the Moss Landing Harbor or Santa Cruz Wharf, RREAS refers to the Rockfish Recruitment and Ecosystem Assessment Survey, and WCGBTS refers to the West Coast Groundfish Bottom Trawl Survey. Isotope (n) refers to the total sample size of individual isotopes samples analyzed. The DA (n) is the number of total DA measurements taken per species. Note, the isotope (n) is often greater than the DA (n) because multiple individuals of a single species collected at a given site were pooled for a combined DA measurement. Mean $\delta^{13}C$ and $\delta^{15}N$ from this table are used for Fig. 2a. (SE) refers to standard error. DA measurements were not obtained from the 2019 specimens (Dungeness crabs, and extra sardines and anchovies) because of timeline limitations from the COVID-19 pandemic. * indicates that the species is considered a potential DA vector using our operational definition. Stations are the locations where specimens were collected.

Common species name	**Collection method**	**Year**	**Isotope (n)**	**Mean $\delta^{13}C$ (SE)**	**Mean $\delta^{15}N$ (SE)**	**DA (n)**	**Mean DA (SE)**	**Stations**
Algae (*Ulva* spp., *Mazzaella* spp)	Coastline	2018	9			NA	NA	
Crustaceans								
Krill (*E. pacifica and T. spinifera)* *	RREAS/ WCGBTS	2018	10	-19.85 (0.25)	10.6 (0.16)	10	0.16 (0.09)	113; 114; 116; 117; 119; 110/212
Prawn (*Sergestidae*)	WCGBTS	2018	2	-20.6 (0.14)	12.32 (0.5)	1	0.25	
Dungeness crab (*M. magister*)	R/V Sheila B	2019	29	-14.86 (0.08)	14.74 (0.08)	NA	NA	C1,2
Echinoderm								
Urchin (*A. fragilis*)	WCGBTS	2018	1	-19.1	10.97	1	0.03	
Mollusks								
Mussel (*M. californianus*) *	Coastline	2018	6	-17.5 (0.49)	10.14 (0.1)	5	0.25 (0.08)	SCW; MLH
Turban Snail (*T. funebralis*)	Coastline	2018	2	-15.2 (0.5)	12.69 (0.34)	NA	NA	
Market Squid (*D. opalescens*)*	RREAS/ WCGBTS	2018	28	-18.49 (0.12)	12.9 (0.1)	5	0.19 (0.05)	114; 115; 119; 110/212
Octopus (*O. deletron*)	WCGBTS	2018	1	-19.95	18.02	1	0.04	
Teleost Fish								
Anchovy (*E. mordax*)*	RREAS/ WCGBTS	2018	48	-18.41 (0.9)	12.36 (0.04)	13	15.03 (4.87)	113-117; 119; 211; 110/212
Anchovy (*E. mordax**	RREAS	2019	21	-17.85 (0.09)	13.42 (0.06)	NA	NA	
Sardine (*S. sagax*)*	RREAS/ WCGBTS	2018	8	-17.73 (0.14)	12.94 (0.06)	2	0.42 (0.1)	113-114; 116; 211; 110/212

Sardine (*S. sagax*)*	RREAS	2019	21	-17.38 (0.1)	12.88 (0.07)	NA	NA	
Juvenile rockfish*	RREAS/ WCGBTS	2018	46	-18.61 (0.13)	12.89 (0.12)	22	0.2 (0.07)	109; 113-117; 119; 212
Shortbelly rockfish (*S. jordani*)*	RREAS/ WCGBTS	2018	19	-19.24 (2.16)	12.72 (0.19)	6	0.05 (0.01)	
Halfbanded rockfish (*S. semicinctus*)*	RREAS/ WCGBTS	2018	14	-19.42 (0.35)	12.59 (0.2)	7	0.44 (0.18)	
Stripetail rockfish (*S. Saxicola*)*	RREAS	2018	10	-19.73 (0.46)	12.8 (0.29)	6	0.11 (0.05)	
Chilipepper rockfish (*S. goodei*)*	WCGBTS	2018	3	-17.79 (0.11)	14.14 (0.21)	1	0.023	
Combfish (*Z. latipimnus*)	WCGBTS	2018	2	-17.1 (0.46)	16.33 (0.11)	1	0.85	
Tropical fish	WCGBTS	2018	4	-16.64 (0.13)	16.21 (0.4)	1	0.046	
Black eel (*L. diapterus*)	WCGBTS	2018	1	-16.77	10.97	1	0.23	
CA grenadier (*N. stelgidolepis*)	WCGBTS	2018	1	-18.59	14.3	1	0.13	
Flatfish (combined)	WCGBTS	2018	9	-17.07 (0.25)	14.4 (0.19)	4	0.05 (0.03)	
Curfin sole (flatfish) (*P. decurren*)	WCGBTS	2018	3	-16.86 (0.75)	13.88 (0.3)	1	0	
Dover sole (flatfish) (*M. pacifica*)	WCGBTS	2018	3	-16.9 (0.16)	14.92 (0.27)	2	0.02 (0.01)	
Pacific sanddab (flatfish) (*C. sordidus*)	WCGBTS	2018	3	-17.45 (0.16)	14.4 (0.14)	1	0.12	
Mola mola (*Mola mola*)	WCGBTS	2018	1	-18.45	18.34	1	0.02	
Predators								
Sea lion (*Z. californianus*)	UCSC – Stranding Network	2017-2019	8	-17.35 (0.19)	17.09 (0.34)	8	0.02 (0.007)	Beaches in Monterey Bay
Spotted ratfish (*H. colliei*)	WCGBTS	2018	1	-17.03	17.37	1	0.12	

A.T2: Ecological information and proposed foraging strategies of key taxa. Data were compiled from previous research studies. Feeding behavior was determined based on previous findings, in addition to horizontal and vertical movement capacity. The foraging strategy was determined by interpreting their isotopic niches.

Species	Feeding Behavior	Horizontal Movement	Vertical Movement	Foraging Strategy	Citation
Sardines	Size selective generalists	Highly mobile	Relatively high, and move more than anchovies	Diet and habitat specialists	(Rykaczewski and Checkley, 2008; Van Der Lingen et al., 2009, 2006)
Anchovies	Size selective generalists	Highly mobile	Medium	Diet and habitat specialists	(Rykaczewski and Checkley, 2008; Van Der Lingen et al., 2009, 2006)
Juvenile rockfish	Opportunistic, size selective generalist	Medium	Medium	Habitat specialist; diet generalist	(Reilly et al., 1992)
Krill	Particulate specialist	Medium	Medium; moves with eddies and currents	Habitat specialist; diet generalist	(Brinton, 1962; Cimino et al., 2020; Gómez-Gutiérrez et al., 2005; Miller and Brodeur, 2007)
Sea Lions	Plastic specialists at an individual level; generalists at a population level	High, coastal (within the continental shelf)	Shallow, < 40 meters average given their placement in the continental shelf	Habitat and diet generalist	(Lowry et al., 1991; Weise and Harvey, 2008)
Mussels	Size selective, movement restricted scavengers	Limited	Limited	Habitat and diet specialist	(Fox and Coe, 1943); (Wohlgeschaffen et al., 1992)
Market Squid	Opportunistic generalist	Coastal, high movement with currents; Less mobile than sardines, anchovies, and sea lions	Restricted to eddies and currents	Habitat specialist; diet generalist	(Ish et al., 2004; Karpov and Cailliet, 1979)
Dungeness crab	Opportunistic generalist	Limited	Medium (between deep-benthic and estuarine habitats)	Habitat specialists; diet generalist	(Stevens et al., 1982)

A.T3: Isotopic niche metrics for each species displayed in Fig 5a. The standard ellipse area (SEA), corrected for sample size (SEA_c), and mean Bayesian standard ellipse area (SEA_b). The 95% confidence intervals (CI) for mean SEA_b were calculated.

	Anchovy	Krill	Juv. rf	Sardine	Market squid	Mussel	Sea lion	Crab
SEA	0.57	1.93	1.96	0.71	0.95	0.21	1.23	0.55

SEA_c	0.58	2.17	2.01	0.73	0.99	0.26	1.44	0.57
SEA_b (mean)	0.58	2.17	2.03	0.73	0.99	0.48	1.54	0.57
95% CI Upper Bound	0.72	3.59	2.68	1.00	1.38	0.92	2.74	0.79
95% CI Lower Bound	0.44	0.95	1.48	0.5	0.63	0.15	0.56	0.36

A.T4: Percent overlap for species in the full SIBER analysis. Percentage overlap corresponds to the percent of ellipse overlap in Fig. 5a between specified taxa. It is the proportion of non-overlapping area of two ellipses * 100.

Species 1	Species 2	Percent Overlap
Anchovy	Juvenile rockfish	27.34%
Anchovy	Sardine	40.00%
Anchovy	Market squid	50.17%
Sardine	Juvenile rockfish	19.59%
Sardine	Market squid	46.23%
Krill	Juvenile rockfish	13.80%
Market squid	Krill	4.19%
Market squid	Juvenile rockfish	38.60%

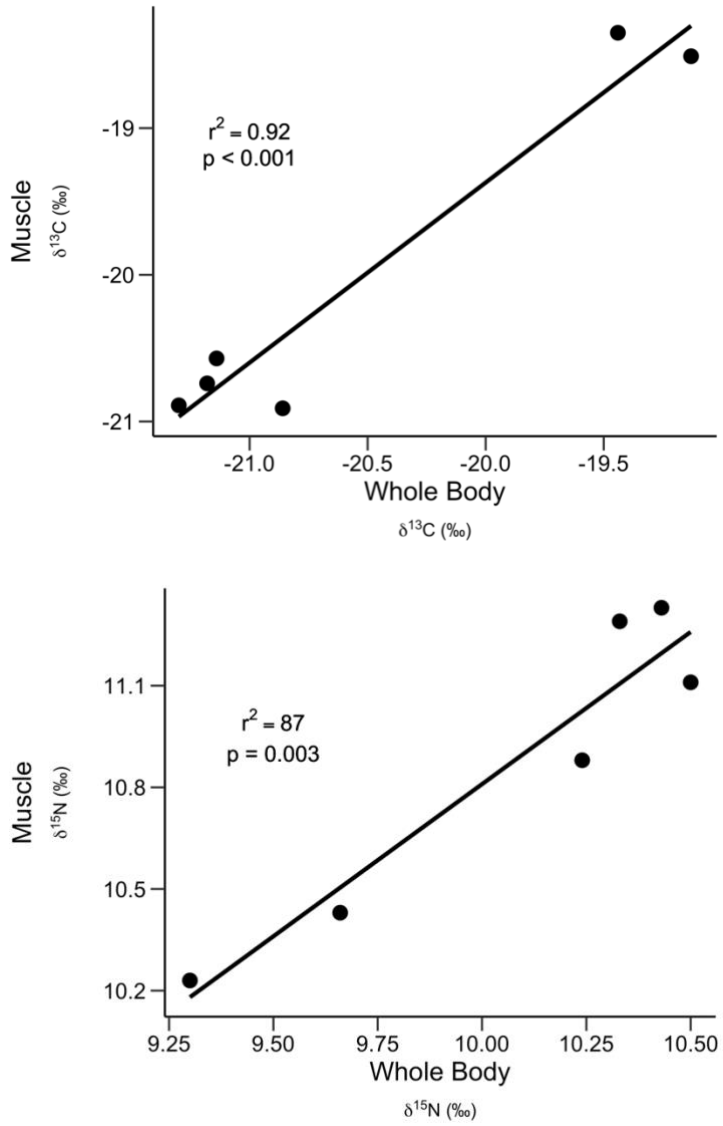
A.T5: Isotopic niche metrics for the site-control analysis displayed. The standard ellipse area corrected for sample size (SEA_c), and mean Bayesian standard ellipse area (SEA_b) and their 95% confidence intervals (CI). Refer to Fig. 5b for SIBER plot and Appendix F2 for area plot.

	Anchovies	Krill	Juvenile rockfish	Sardine	Squid	Crab
SEA	0.45	1.68	0.67	0.19	0.8	0.55
SEA_c	0.48	2.24	0.8	0.23	0.84	0.57
SEA_b (mean)	0.5	2.13	0.83	0.84	0.23	0.57
95% CI Upper Bound	0.7	4.42	1.51	1.2	0.42	0.78
95% CI Lower Bound	0.26	0.55	0.26	0.51	0.08	0.36

A.T6: Metrics for the proportion of isospace that each of the six potential vectors occupy in comparison to the entire subsampled community. Metrics include the standard ellipse area (SEA), SEA corrected for sample size (SEA_c), and mean Bayesian standard ellipse area (SEA_b), which were calculated in SIBER. Metrics are associated with Figure 2b.

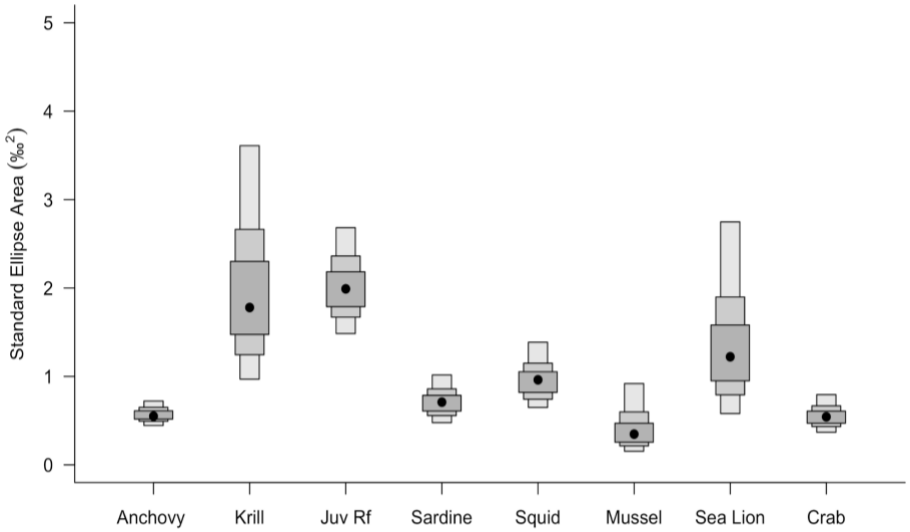
	Anchovy	Krill	Juvenile rockfish	Sardine	Market squid	Mussel
SEA	7.89	26.62	27.05	9.75	13.13	2.9
SEA_c	7.98	29.86	27.58	10.08	13.6	3.6
SEA_b (mean)	7.96	29.7	28.3	10.07	13.5	6.5

Appendix Figure 1:



A.F1: Least squares regressions for krill. The correlations between whole body and muscle of krill used to convert $\delta^{13}C$ and $\delta^{15}N$ whole body values to muscle equivalents.

Appendix Figure 2:



A.F2: Bayesian ellipse modeling. The Bayesian ellipse area (SEA_b) and 95% confidence interval associated with Fig. 5a. Black dots represent the mean SEA_b after 10,000 iterations. The surrounding shaded density plots represent the 50%, 75%, and 95% credible intervals.