Mediterranean Marine Science

Vol 26, No 1 (2025)

Mediterranean Marine Science

Trophic assessment and isotopic niches of two congeneric pipefishes in a wetland of the Aegean Sea

SULE GURKAN, PAULA ARAGONESES, DENIZ INNAL, CLARA MENDOZA-SEGURA, MIQUEL PLANAS

doi: 10.12681/mms.36582

Supplementary Data

Mediterranean Marine Science
Indexed in WoS (Web of Science, ISI Thomson) and SCOPUS
www.hcmr.gr
DOI: https://doi.org/10.12681/mms.36582

Trophic assessment and isotopic niches of two congeneric pipefishes in a wetland of the Aegean Sea

Sule GURKAN, Paula ARAGONESES, Deniz INNAL, Clara MENDOZA-SEGURA, and Miquel PLANAS

Mediterranean Marine Science, 26 (1) 2025

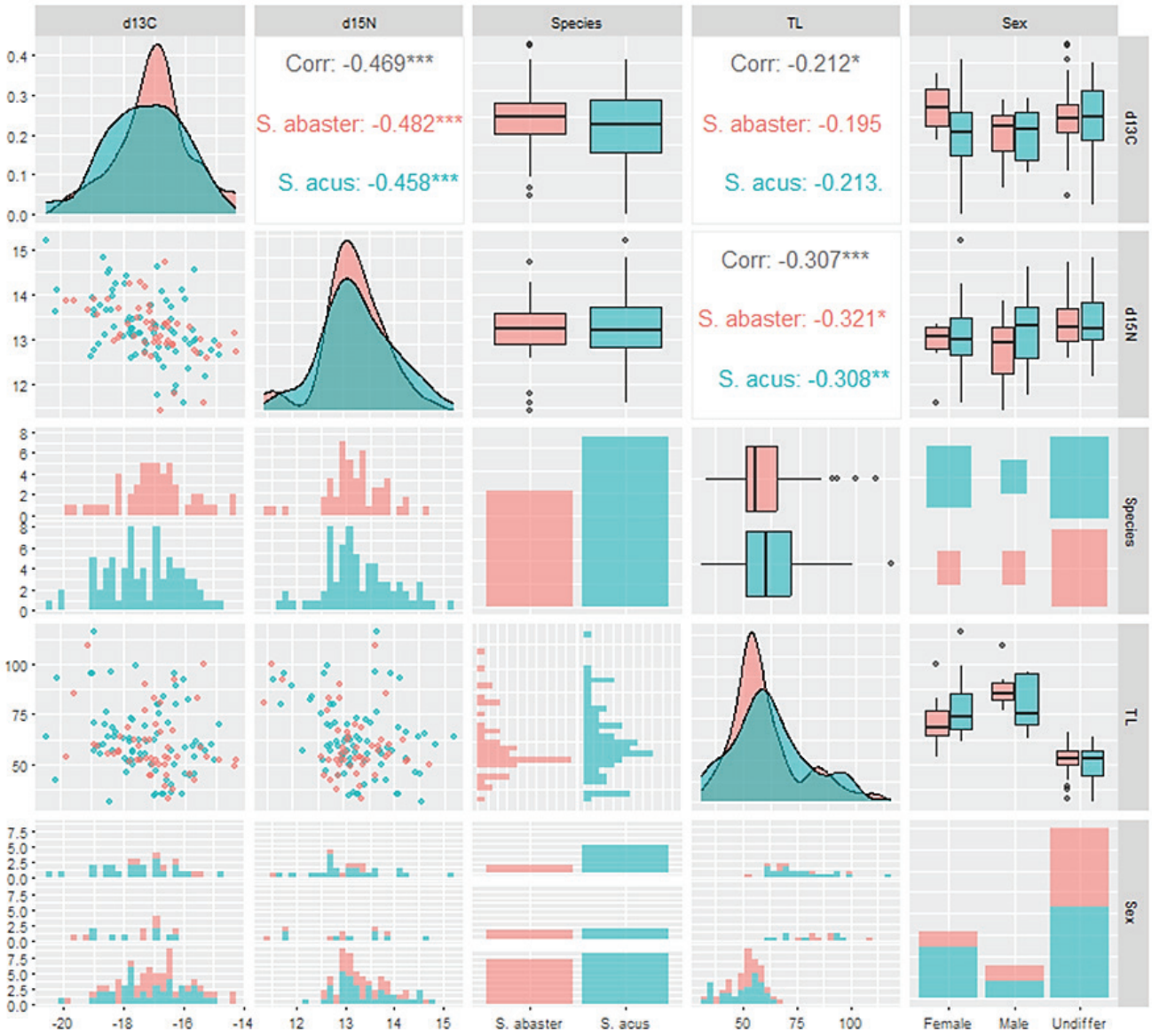

Fig. S1: Global information on *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

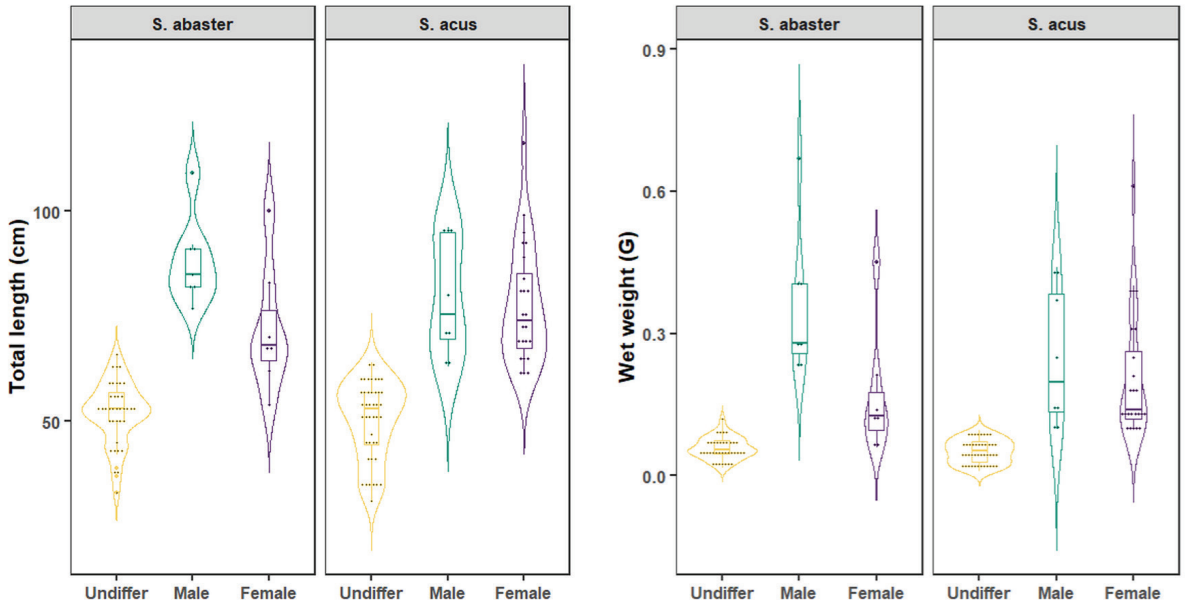

Fig. S2: Lengths and weights of *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

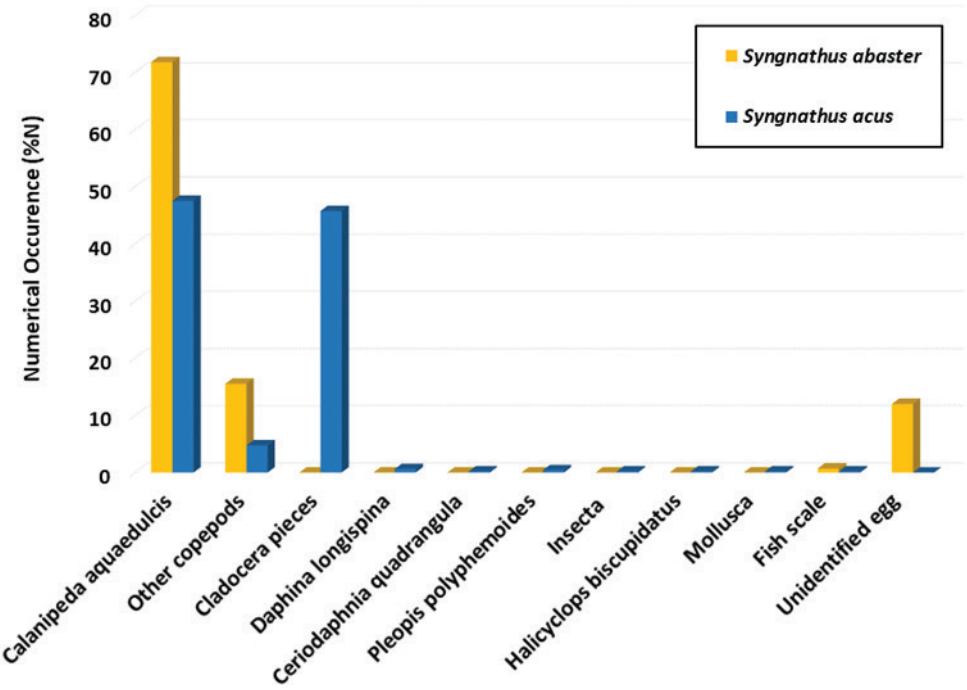

Fig. S3: Numerical occurrence (%N) of prey items in the guts of *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

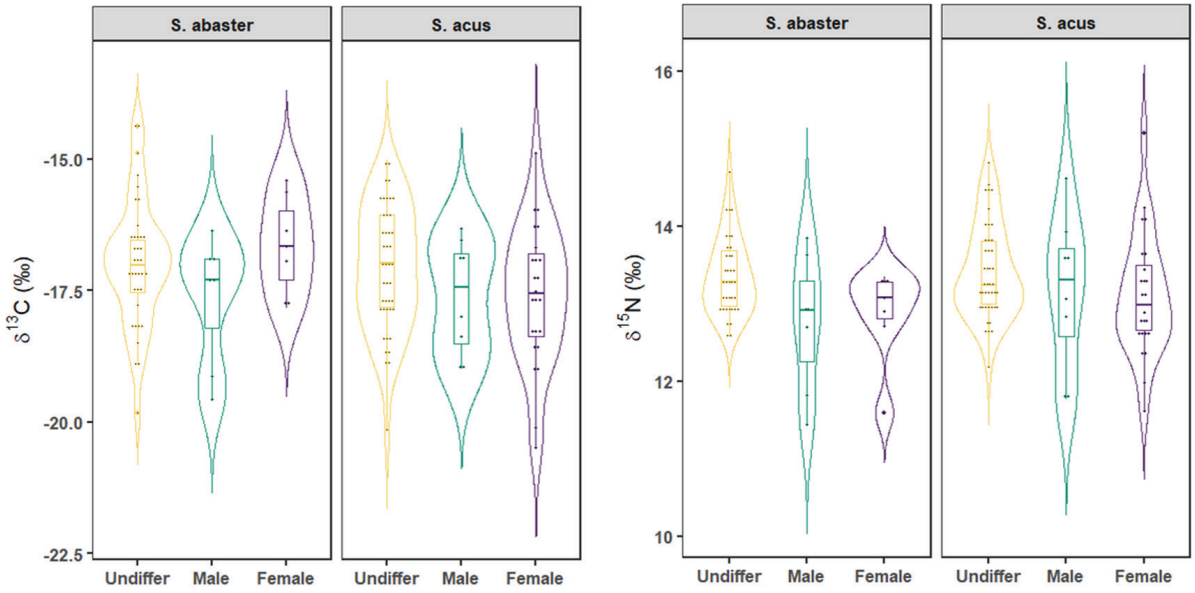

Fig. S4: Isotopic values ($\delta^{13}C$ and $\delta^{15}N$) of *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

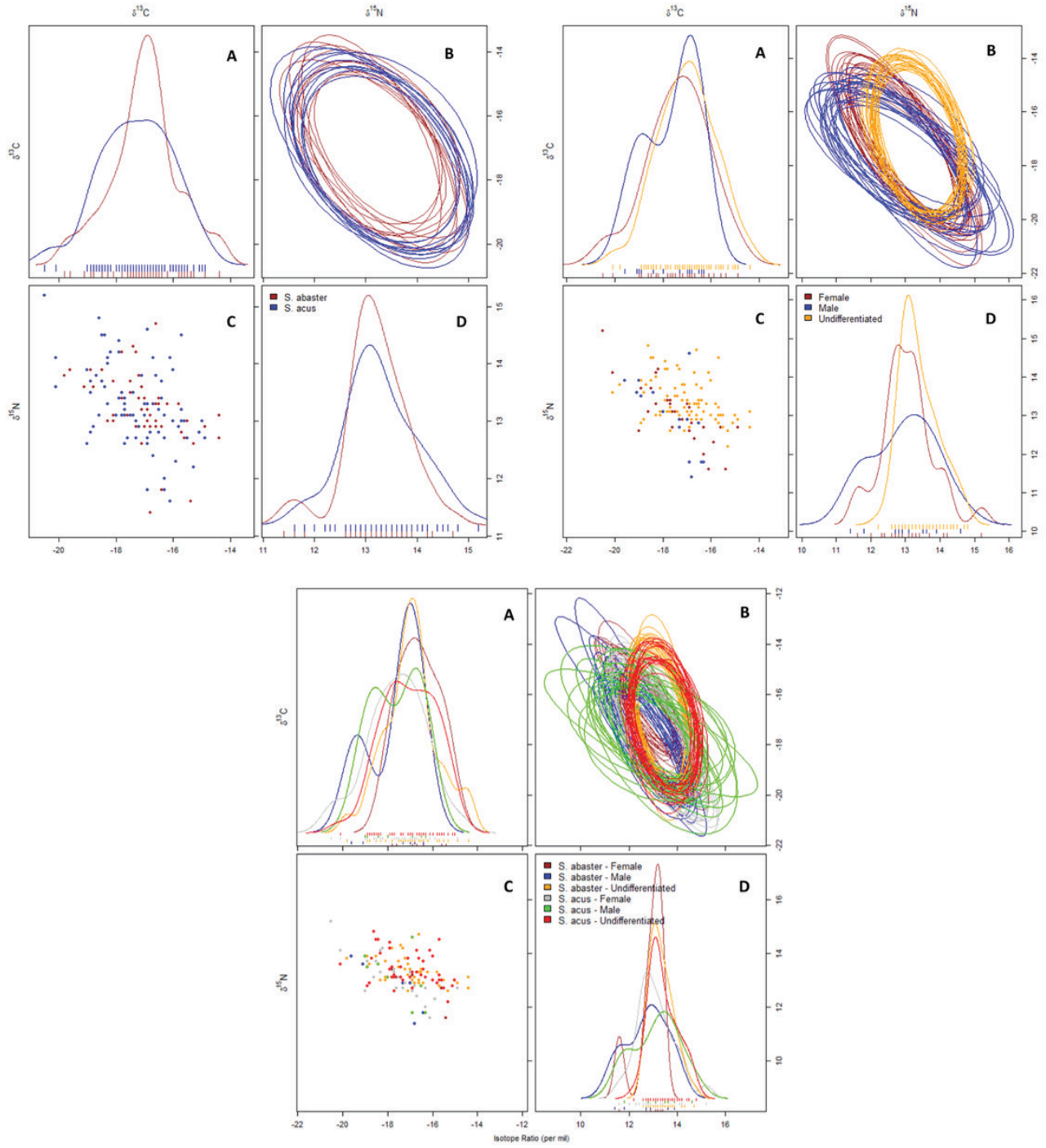

Fig. S5: Niche plots (95% alpha) (A - $\delta^{15}N$; D - $\delta^{13}C$), density distributions (B) and raw data (C) for each pairwise combination of isotope ($\delta^{13}C$ and $\delta^{15}N$) data in *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

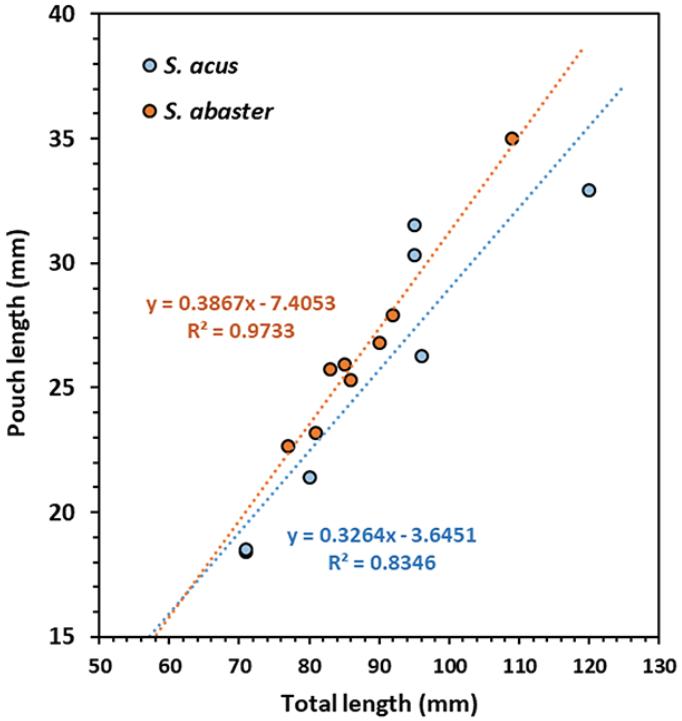

Fig. S6: Relationship between total length and pouch length in *Syngnathus abaster* and *Syngnathus acus* males from Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye).

Table S1. $\delta^{13}C$ and $\delta^{15}N$ values used as baseline 1 and baseline 2 (*Musculus costulatus* sampled in the Cíes Archipelago, NW Spain). Data from Planas (2022).

Baselines	Sample	$\delta^{13}C$ ‰	$\delta^{15}N$ ‰
Baseline1	Spring-2017	-18.73	5.79
	Spring-2017	-19.12	5.31
	Spring-2017	-18.55	5.94
	Summer-2017	-18.38	5.83
	Summer-2017	-18.53	5.80
	Summer-2017	-17.94	6.06
Baseline2	Spring-2018	-17.86	4.88
	Spring-2018	-17.02	5.44
	Spring-2018	-16.57	5.21
	Summer-2018	-16.26	5.98
	Summer-2018	-17.23	5.45
	Summer-2018	-16.42	6.48

Table S2. General information of *Syngnathus abaster* and *Syngnathus acus* specimens collected in Metruk Tuzla (Boğaziçi Tuzla Lagoon, Türkiye) in 2019.

Species	Season	Sex	Total length (mm)	Weight (g)	Gut W (mg)	% C	% N	C/N	δ^{13}C ‰	δ^{15}N ‰
S. acus	Spring	Female	92	0.320	0.0098	38.8	12.5	3.11	-16.1	11.6
S. acus	Spring	Female	80	0.210	0.0054	40.3	12.8	3.15	-16.8	12.8
S. acus	Spring	Female	89	0.300	0.0104	37.6	12.0	3.14	-16.3	12.0
S. acus	Spring	Female	84	0.250	0.0142	39.7	12.7	3.13	-16.7	12.4
S. acus	Spring	Male	80	0.250	0.012	39.1	12.5	3.14	-16.9	11.8
S. acus	Spring	Female	82	0.170	0.0168	38.2	12.3	3.12	-15.9	12.3
S. acus	Spring	Male	95	0.370	0.01	39.9	12.7	3.14	-16.3	11.8
S. acus	Spring	Female	80	0.190	0.0088	39.6	12.7	3.12	-16.3	12.7
S. acus	Summer	Male	96	0.420	0.0024	38.2	12.1	3.16	-18.4	13.6
S. acus	Summer	Female	116	0.610	0.0082	42.0	13.3	3.16	-18.9	13.7
S. acus	Summer	Female	95	0.380	0.007	41.4	12.9	3.20	-19.0	12.6
S. acus	Summer	Male	95	0.440	0.0053	37.5	11.8	3.18	-19.0	13.9
S. acus	Summer	Female	99	0.400	0.01	38.0	11.9	3.18	-17.6	12.7
S. acus	Summer	Female	93	0.380	0.006	36.6	10.7	3.43	-20.1	14.1
S. acus	Summer	Female	73	0.139	0.0018	45.7	14.2	3.21	-17.7	13.3
S. acus	Summer	Female	69	0.127	0.0011	44.8	14.2	3.17	-17.3	12.7
S. acus	Summer	Male	71	0.145	0.0025	44.8	14.3	3.14	-16.5	12.8
S. acus	Summer	Female	62	0.100	0.0013	44.2	14.0	3.16	-17.0	13.3
S. acus	Summer	Male	71	0.143	0.0015	43.2	13.5	3.20	-18.9	13.5
S. acus	Summer	Female	64	0.105	0.0012	44.1	13.9	3.18	-18.3	13.3
S. acus	Summer	Female	75	0.119	0.001	44.0	13.5	3.27	-16.9	12.6
S. acus	Summer	Female	61	0.098	0.0012	43.7	13.9	3.14	-17.2	12.9
S. acus	Summer	Female	76	0.183	0.0023	43.4	13.6	3.19	-18.5	13.7
S. acus	Summer	Female	70	0.140	0.006	44.1	14.0	3.16	-18.6	13.1
S. acus	Summer	Female	64	0.122	0.0012	43.7	13.6	3.20	-20.5	15.2
S. acus	Summer	Female	62	0.095	0.001	44.2	13.7	3.23	-17.5	13.1
S. acus	Summer	Female	72	0.095	0.0013	43.9	13.8	3.18	-17.7	13.4
S. acus	Summer	Female	66	0.119	0.0011	44.1	13.9	3.18	-18.2	14.2
S. acus	Summer	Male	63	0.098	0.0014	43.9	13.5	3.25	-18.0	13.1
S. acus	Summer	Male	65	0.108	0.0011	41.7	13.2	3.17	-16.9	14.6
S. acus	Summer	Undif.	57	0.071	0.0003	45.0	14.1	3.20	-15.3	12.2
S. acus	Summer	Female	70	0.140	0.0021				-14.9	12.7
S. acus	Summer	Undif.	59	0.060	0.0022	44.1	13.8	3.19	-15.7	13.2
S. acus	Summer	Undif.	58	0.072	0.0016	43.5	13.2	3.30	-16.0	13.9
S. acus	Summer	Undif.	61	0.087	0.002	45.5	14.4	3.17	-15.6	13.0
S. acus	Summer	Female	68	0.140	0.0051	44.4	13.9	3.19	-18.3	14.1
S. acus	Summer	Undif.	61	0.092	0.0011	42.5	12.6	3.38	-17.8	13.5
S. acus	Summer	Undif.	57	0.070	0.0013	43.6	13.7	3.18	-18.9	12.8
S. acus	Summer	Undif.	55	0.055	0.0011	44.2	13.8	3.21	-17.4	13.5
S. acus	Summer	Undif.	57	0.068	0.0014	43.7	13.6	3.20	-18.3	14.0
S. acus	Summer	Undif.	56	0.074	0.0011	43.8	13.5	3.24	-17.7	13.2
S. acus	Summer	Undif.	54	0.062	0.0003	44.0	13.8	3.20	-15.7	13.0
S. acus	Summer	Undif.	59	0.072	0.0021	44.4	13.9	3.19	-18.8	12.9
S. acus	Summer	Undif.	59	0.083	0.0029	43.0	12.8	3.35	-15.5	12.7
S. acus	Summer	Undif.	55	0.052	0.0016	37.6	11.9	3.15	-18.7	13.8
S. acus	Summer	Undif.	52	0.045	0.002	43.3	13.6	3.19	-17.7	12.6

Continued

Table S2 continued

Species	Season	Sex	Total length (mm)	Weight (g)	Gut W (mg)	% C	% N	C/N	δ^{13}C ‰	δ^{15}N ‰
S. acus	Summer	Undif.	63	0.096	0.0043	43.5	13.6	3.21	-17.8	13.1
S. acus	Summer	Undif.	60	0.085	0.0011	43.9	13.8	3.18	-15.1	12.8
S. acus	Summer	Undif.	50	0.050	0.0021	43.5	13.6	3.20	-17.1	13.8
S. acus	Summer	Undif.	42	0.023	0.0016	42.2	12.7	3.32	-16.6	13.8
S. acus	Summer	Undif.	51	0.056	0.0023	43.8	13.4	3.26	-17.9	13.4
S. acus	Summer	Undif.	64	0.079	0.0022	44.0	13.7	3.22	-18.5	14.5
S. acus	Summer	Undif.	60	0.085	0.0029	40.3	11.8	3.41	-18.6	14.8
S. acus	Summer	Undif.	50	0.040	0.0013	43.1	13.4	3.21	-16.3	13.1
S. acus	Summer	Undif.	53	0.034		42.8	13.4	3.21	-17.4	13.1
S. acus	Summer	Undif.	45	0.034	0.0043	43.4	13.4	3.24	-16.0	13.0
S. acus	Summer	Undif.	50	0.042	0.0053	43.6	13.6	3.22	-17.7	13.2
S. acus	Summer	Undif.	53	0.051	0.0017	42.1	12.7	3.32	-17.9	14.2
S. acus	Summer	Undif.	46	0.034		42.5	12.6	3.37	-17.9	14.4
S. acus	Summer	Undif.	57	0.063		43.5	13.7	3.19	-16.4	13.7
S. acus	Summer	Undif.	52	0.054	0.003	43.6	13.5	3.23	-15.0	13.0
S. acus	Summer	Undif.	57	0.085		42.9	13.3	3.22	-17.7	13.1
S. acus	Summer	Undif.	45	0.027		41.6	12.0	3.46	-15.7	14.5
S. acus	Summer	Undif.	44	0.029		42.6	12.9	3.30	-15.8	12.9
S. acus	Summer	Undif.	35	0.015		43.8	13.3	3.30	-16.7	13.3
S. acus	Summer	Undif.	47	0.038		42.6	13.2	3.24	-16.9	12.7
S. acus	Summer	Undif.	55	0.062		43.3	13.5	3.21	-17.3	13.0
S. acus	Summer	Undif.	35	0.017		44.0	13.3	3.30	-16.7	14.1
S. acus	Summer	Undif.	40	0.024		44.1	13.4	3.29	-16.4	13.4
S. acus	Summer	Undif.	42	0.029		43.2	13.2	3.27	-20.1	13.6
S. acus	Summer	Undif.	35	0.013		41.5	12.1	3.42	-16.1	14.1
S. acus	Summer	Undif.	35	0.017		42.7	13.0	3.29	-16.9	13.3
S. acus	Summer	Undif.	34	0.010		42.6	12.7	3.35	-17.0	13.1
S. acus	Summer	Undif.	36	0.015		42.2	12.8	3.29	-16.5	13.2
S. acus	Summer	Undif.	31	0.011		43.5	13.0	3.35	-18.4	14.5
S. abaster	Spring	Male	92	0.41	0.006	38.4	12.4	3.10	-16.4	11.8
S. abaster	Spring	Female	100	0.45	0.0102	36.4	11.9	3.07	-15.4	11.6
S. abaster	Spring	Male	81	0.28	0.0038	36.6	11.8	3.11	-16.8	11.4
S. abaster	Spring	Male	90	0.40	0.0041	36.6	11.9	3.09	-17.3	12.9
S. abaster	Spring	Male	83	0.24	0.0057	36.4	11.7	3.12	-17.0	12.9
S. abaster	Spring	Male	77	0.23	0.0014	37.5	12.2	3.08	-17.3	12.7
S. abaster	Spring	Female	83	0.21	0.0067				-15.6	12.7
S. abaster	Spring	Undif.	54	0.06	0.0031	39.6	12.8	3.09	-15.3	12.6
S. abaster	Spring	Undif.	42	0.03	0.0014	41.9	13.1	3.21	-15.7	12.8
S. abaster	Spring	Undif.	37	0.04	0.0008	42.8	13.5	3.16	-16.4	12.9
S. abaster	Summer	Male	109	0.67	0.006	39.7	12.7	3.13	-19.1	13.6
S. abaster	Summer	Male	85	0.28	0.004	41.0	12.8	3.19	-19.6	13.9
S. abaster	Summer	Female	67	0.12	0.002	43.8	13.7	3.19	-16.4	12.9
S. abaster	Summer	Female	68	0.13	0.001	43.3	13.6	3.18	-17.8	13.4
S. abaster	Summer	Undif.	64	0.10	0.001	43.3	13.7	3.16	-18.1	13.1
S. abaster	Summer	Undif.	66	0.12	0.001	43.2	13.6	3.17	-16.8	13.1
S. abaster	Summer	Undif.	58	0.08	0.001	42.9	13.5	3.17	-16.5	13.3
S. abaster	Summer	Undif.	62	0.09	0.001	43.7	13.7	3.18	-17.2	13.8

Continued

Table S2 continued

Species	Season	Sex	Total length (mm)	Weight (g)	Gut W (mg)	% C	% N	C/N	δ^{13}C ‰	δ^{15}N ‰
S. abaster	Summer	Undif.	55	0.08	0.002	42.7	13.5	3.17	-18.5	13.9
S. abaster	Summer	Undif.	54	0.07	0.001	43.4	13.5	3.20	-19.8	13.8
S. abaster	Summer	Undif.	59	0.09	0.001	42.9	13.5	3.18	-17.5	13.7
S. abaster	Summer	Undif.	53	0.06	0.0005	42.8	13.5	3.17	-17.2	13.4
S. abaster	Summer	Undif.	59	0.08	0.0007	43.3	13.7	3.15	-18.8	13.6
S. abaster	Summer	Undif.	57	0.08	0.001	43.1	13.6	3.18	-18.1	13.7
S. abaster	Summer	Undif.	58	0.07	0.001	43.3	13.6	3.17	-15.5	13.0
S. abaster	Summer	Undif.	62	0.08	0.002	43.8	13.8	3.17	-17.3	14.2
S. abaster	Summer	Undif.	52	0.06	0.0005	42.8	13.4	3.20	-14.9	12.9
S. abaster	Summer	Undif.	50	0.05	0.001	43.7	13.6	3.23	-17.0	13.4
S. abaster	Summer	Undif.	56	0.07	0.0006	43.1	13.3	3.23	-18.1	13.0
S. abaster	Summer	Undif.	54	0.05	0.0006	42.7	13.3	3.21	-16.2	13.3
S. abaster	Summer	Undif.	60	0.08	0.0009	42.1	13.3	3.16	-18.9	13.9
S. abaster	Summer	Female	54	0.06	0.0003	41.5	13.0	3.18	-16.7	13.3
S. abaster	Summer	Undif.	50	0.06	0.0022	40.0	12.1	3.31	-16.6	14.7
S. abaster	Summer	Female	62	0.07	0.0006	42.9	13.5	3.17	-17.6	13.1
S. abaster	Summer	Undif.	52	0.05	0.0005	42.4	13.3	3.19	-16.9	13.0
S. abaster	Summer	Undif.	53	0.05	0.0008	41.7	13.0	3.20	-17.1	13.2
S. abaster	Summer	Undif.	53	0.05	0.0011	42.9	13.3	3.22	-16.6	13.0
S. abaster	Summer	Undif.	52	0.06	0.0006	43.8	13.7	3.19	-17.5	13.5
S. abaster	Summer	Undif.	52	0.05	0.001	42.7	13.4	3.19	-14.4	12.7
S. abaster	Summer	Undif.	55	0.06	0.0007	42.3	13.2	3.21	-18.3	13.0
S. abaster	Summer	Undif.	49	0.04	0.0004	42.9	13.5	3.18	-14.4	13.1
S. abaster	Summer	Undif.	50	0.05	0.0009	42.7	13.3	3.21	-16.8	12.9
S. abaster	Summer	Undif.	52	0.05	0.0006	43.3	13.6	3.18	-17.4	14.3
S. abaster	Summer	Undif.	51	0.05	0.0009	42.8	13.4	3.20	-17.8	14.2
S. abaster	Summer	Undif.	44	0.03	0.0006	42.1	13.1	3.22	-16.6	12.9
S. abaster	Summer	Undif.	44	0.04	0.0009	42.9	13.4	3.21	-17.1	13.6
S. abaster	Summer	Undif.	44	0.02		43.2	13.6	3.18	-17.1	12.6
S. abaster	Summer	Undif.	33	0.02		42.6	13.0	3.27	-16.5	13.4
S. abaster	Summer	Undif.	45	0.03		41.9	13.1	3.21	-15.8	13.3
S. abaster	Summer	Undif.	39	0.02		42.5	13.0	3.26	-16.6	13.3
S. abaster	Summer	Female	70	0.14	0.0018	42.6	13.5	3.16	-16.9	13.2

References

Planas, M., 2022. Ecological traits and trophic plasticity in the greater pipefish *Syngnathus acus* in the NW Iberian Peninsula. *Biology*, 11 (5), 712.