

Supplementary material

Table Sup1. Criteria for the sector boundaries (S1 to S14), since 1999, in the Media Luna Spring, San Luis Potosí, Mexico (adapted from Palacio-Núñez et al., 2010). The anthropic impact degree, according to tourism activity, was categorized by multicriteria analysis (e.g., noise level at the site, number of people, avifauna abundance, status of underwater vegetation).

Sector	Water depth range	Underwater coverage categories	Anthropic Impact degree
S1	-36.2 m ~ 0.0 m	Bare bottom by tourism, Big carpet patch, Bare bottom by depth, Mature shape patch	Very High
S2	-2.6 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom	Moderate
S3	-2.5 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom	Low
S4	-2.5 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom	Very Low
S5	-2.0 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom, Small carpet	Very Low
S6	-2.2 m ~ 0.0 m	Big carpet, Natural bare bottom, Small carpet	Very Low
S7	0.0 m ~ -2.0 m	Big carpet, Natural bare bottom, Small carpet	Very Low
S8	-1.6 m ~ 0.0 m	Big carpet, Natural bare bottom, Small carpet	Very Low
S9	-1.9 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom	Very Low
S10	-1.5 m ~ 0.0 m	Big carpet, Mature shape, Natural bare bottom, Bare bottom by tourism	High
S11	-2.5 m ~ 0.0 m	Bare bottom by tourism	Very high
S12	-2.5 m ~ 0.0 m	Bare bottom by tourism, Big carpet patch	Very high
S13	-2.5 m ~ 0.0 m	Bare bottom by tourism, Big carpet patch, Mature shape patch	Very high
S14	-2.9 m ~ 0.0 m	Bare bottom by tourism, Big carpet patch, Mature shape patch	Very high

Table Sup2. Bivariate correlation between the variables water depth (WDp) and underwater coverage (UC), by summer event, in the Media Luna spring, San Luis Potosí, Mexico. In addition, we included the significance ($P > 0.05$) by bivariate correlation. Both variables were independent of each other, with a correlation value less than ± 0.70 , in all summers, so we retained both for use in the spatial distribution models.

	Summer period		
	1999	2009	2019
UC ~ WDp	-0.65	-0.62	-0.63
<i>P</i> - value	2.2E-16	2.2E-16	2.2E-16



Figure Sup1. *Herichthys labridens* individuals (Pellegrin, 1903). In general, this fish is of robust condition; its body is laterally compressed with a curved profile in the frontal zone, as well as long and sharp snout with the lower jaw slightly protruding. Thick lips with anterior dentition and a very particular break on the lower one. Pelvic fins of short length. Males are slightly larger (0.18 - 0.20 m) compared to females (0.16 m). Coloration is a combination of yellow or gold with five or six mottled black spots positioned on the sides. In the case of males, the lower jaw is bluish with spots of the same color throughout the body (Soto-Galera, 2019; photo taken by Palacio-Núñez, July, 2019). Miller et al. (2005) describe it as a species that presents sexual dimorphism, characterized by the size of the individuals and the fact that fish are found in pairs. However, in our observations and our photographic collection, the reported difference in size between sexes has not been recorded, and a large percentage of the specimens do not occur in pairs.

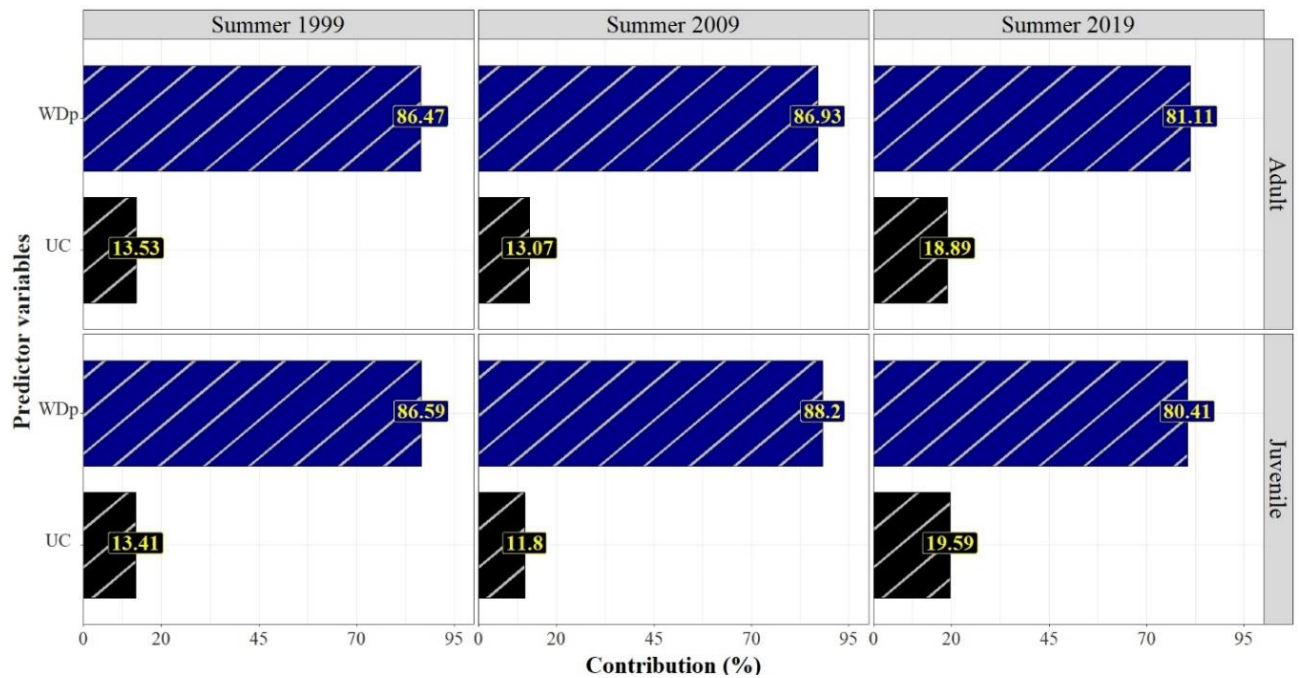


Figure Sup2. Percent contribution of the variables to total variance water depth (WDp) and underwater coverage (UC) in the Media Luna spring, San Luis Potosí, Mexico. A label was included with the relative value for each variable by summer event and life stage of *H. labridens*. Both predictors were retained for the distribution models because their contribution to total variance was $\geq 2\%$.

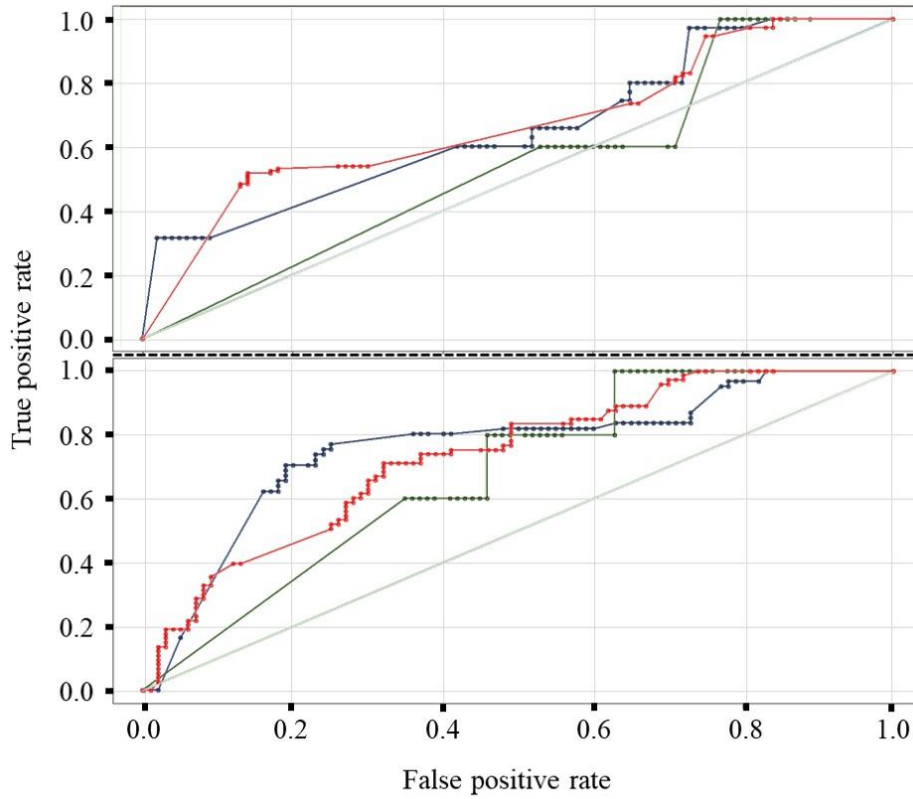


Figure Sup3. ROC curves plots of DOMAIN models for adult and juvenile stages of *H. labridens* in the summer events of 1999 (red), 2009 (green), and 2019 (blue), in the Media Luna spring, San Luis Potosí, Mexico. Each ROC curve estimates the predictive performance of the model from one test group for occurrence and background points, as well as one training group for occurrence. The gray line indicates the trend of random performance with $AUC \leq 0.5$ (equivalent to an unreliable prediction).

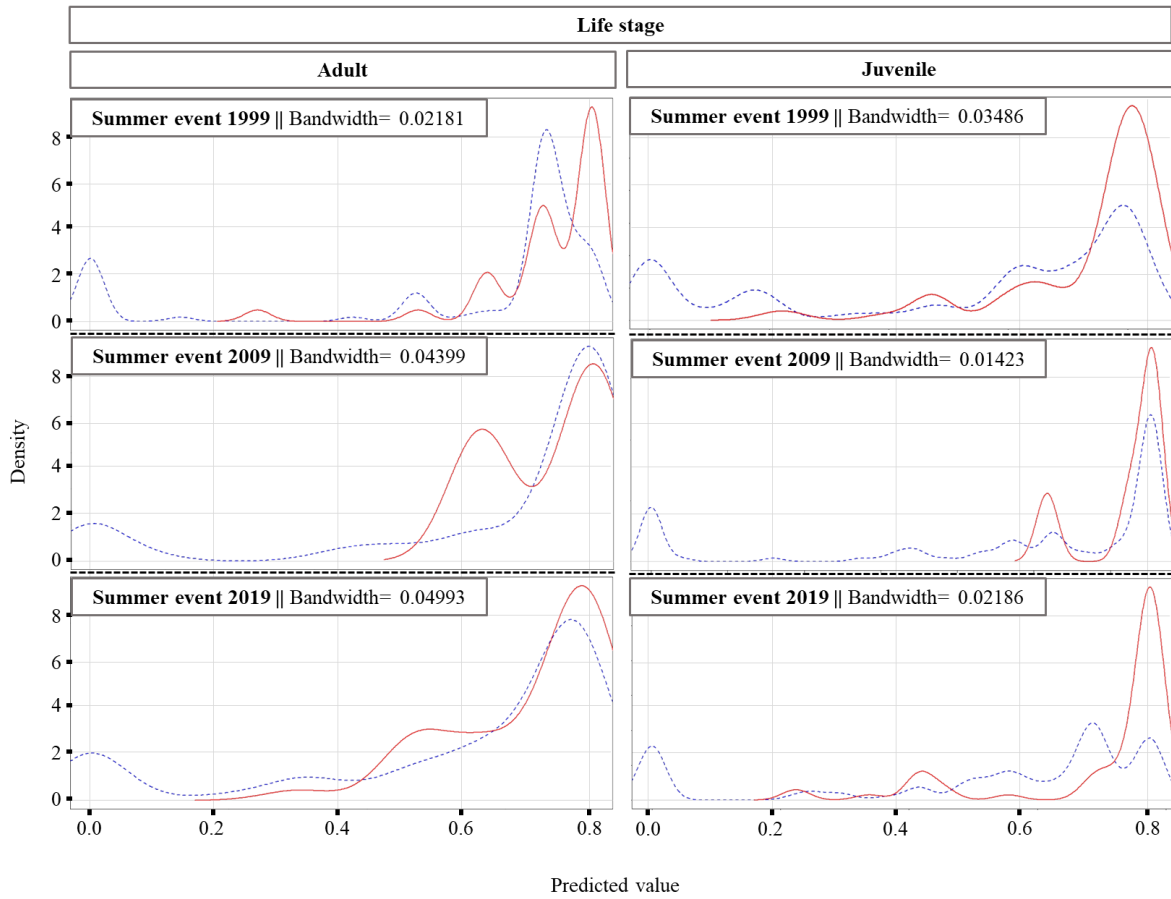


Figure Sup4. Partial ROC plots for validation of DOMIAN models of the adult and juvenile stage of *H. labridens* in the Media Luna spring, San Luis Potosí, Mexico. Validation was performed on the three summer events (in the years 1999, 2009, and 2019). Bimodality presented by group scores, where solid (red) lines represent positive confirmed cases and dotted (blue) lines represent negative cases (AUC ratio > 1.0).