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ROAD CROSSINGS AS BARRIERS TO SMALL FISH IN VASCÃO RIVER

The first case of barrier removal and rehabilitation of fluvial continuity

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CONNECTED RIVERS
International seminar on scaling up dam removal as a river restoration tool in Europe.
19 – 21 May, 2022
Lisbon, Portugal

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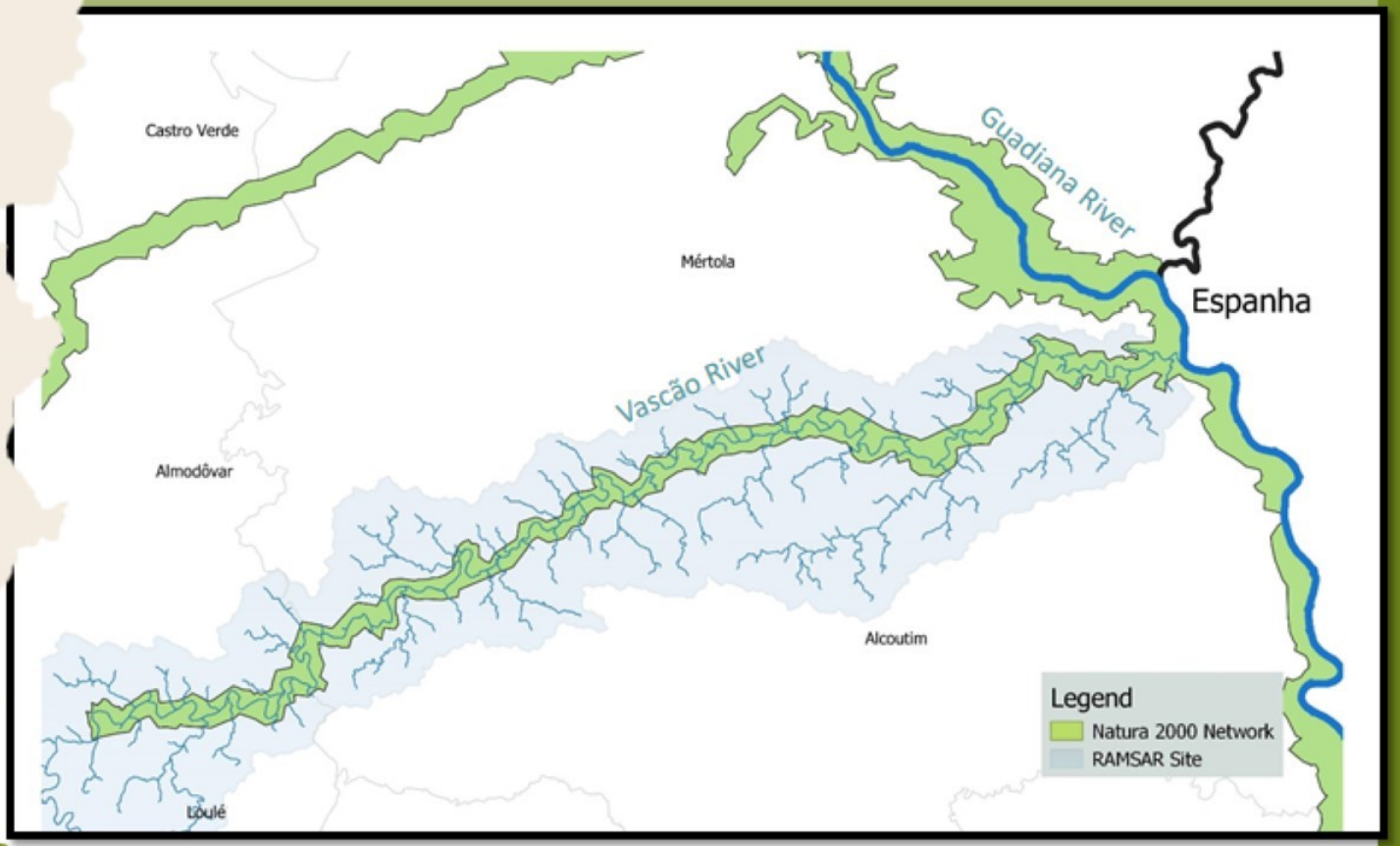
VASCÃO RIVER

Natura 2000 Network - Site Guadiana PTCON0036



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VASCÃO RIVER

11 freshwater fish species

One of the last five populations of *Anaecypris hispanica*

Loss of river continuity is considered one of the main threats to fish species

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Pseudochondrostoma willkommii


Anaecypris hispanica


Barbus microcephalus


Salaria fluviatilis

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A barrier to fish passage can be anything that blocks fish moving through a stream, for example dams, weirs and road crossings.

A survey was carried out for all potential obstacles to fish passage in the stretch of the Vascão river located in the SAC Guadiana PTCON0036 of the Natura 2000 network.

Survey Method

Potencial barriers to fish passage were identified using:

1. Aerial imagery to identify locations where the river and road crossings intersect and other type of barriers as weirs.
2. The locations identified through aerial images were then compared to topographic maps to identify further possible barrier sites.
3. All intersections between roads and the river and other barriers identified were visited and assessed to see if they formed a barrier to fish passage.

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Barriers that potentially affect the fluvial continuum of Vascão River

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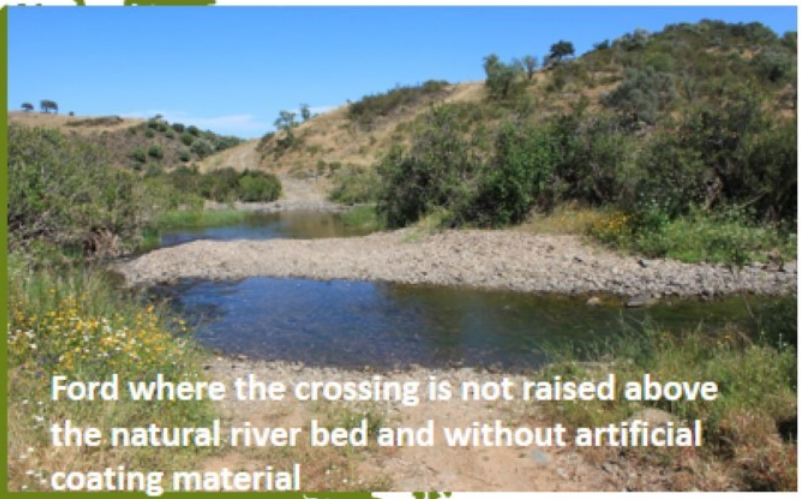
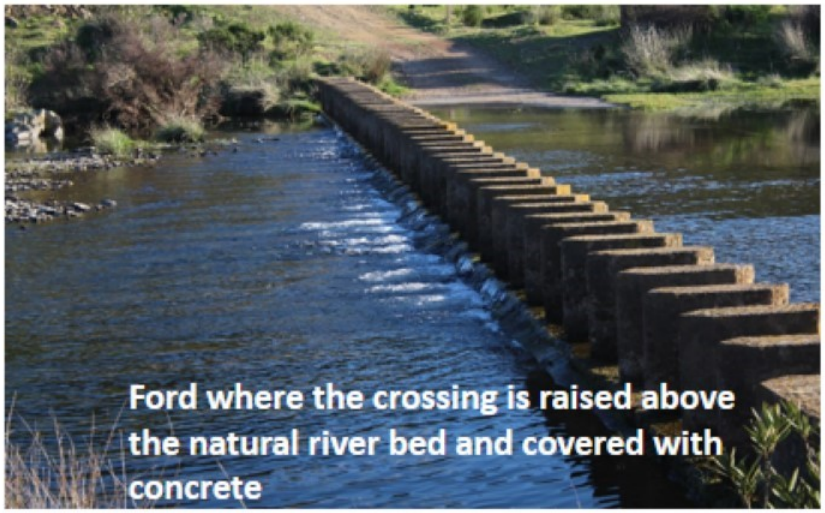
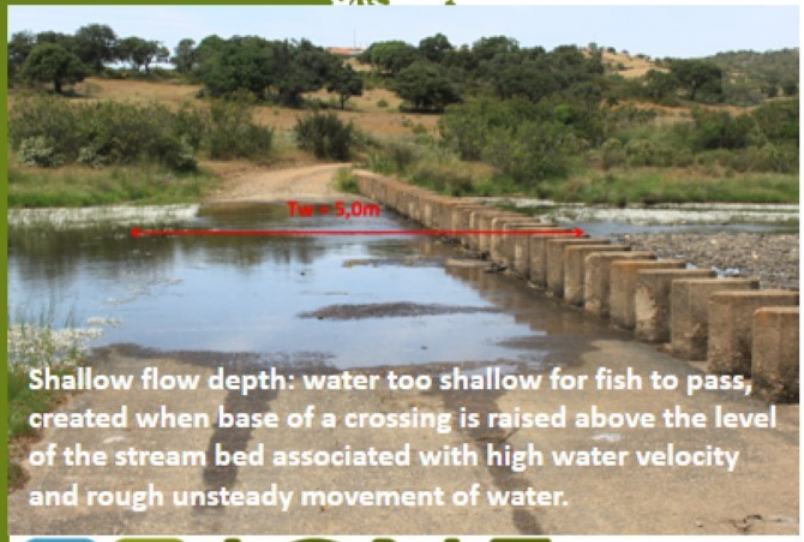
Why can't fish cross the road?



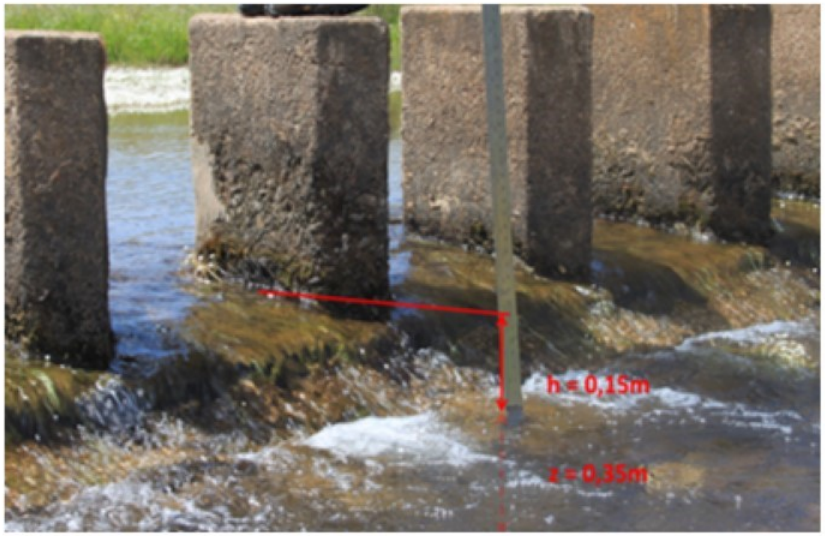
Ford where the crossing is not raised above the natural river bed and without artificial coating material



Ford where the crossing is raised above the natural river bed and covered with concrete



Shallow flow depth: water too shallow for fish to pass, created when base of a crossing is raised above the level of the stream bed associated with high water velocity and rough unsteady movement of water.



Downstream drop: vertical distance > 0,05 m between the water in the crossing and the water downstream of the crossing

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Evaluation of the transversal barriers in Vascão river using the Catalan ICF index

Quality classes and score ranges of the ICF

Range	Quality	Interpretation
≥ 95	Very Good	All the potentially present groups of fish can pass in nearly any hydrological situation. Absence of obstacles for fishes or existence of a partial or total demolition of na obstacle.
75 - 94	Good	The majority of the potentially present fish groups can pass in nearly any hydrological situation. Presence of a small obstacle or with a good fish pass.
50 - 74	Moderate	The majority or some of the potentially present fish groups can pass, in any or in some hydrological situations. Presence of a relatively permeable obstacle for fishes with too specific or little functional fish pass.
25 - 49	Poor	Only one or few species of the potentially presente fish groups can pass, and in determined hydrological situations. Presence of an obstacle with very specific or very little functional fish pass.
< 25	Bad	No species of the potentially present fish groups or only in some very exceptional hydrological situations can pass. Presence of a quite big obstacle without any fish passo r with little or non functional fish pass.

COD BARRIER	LONGITUDE	LATITUDE	TYPE CODE	SUBTYPE CODE	SUBTYPE NAME	ICF Index Score	Distance to the most upstream point of the SCI (m)	Distance to the barrier immediately upstream (m)
CNCF000001	7°59'4.50"W	37°23'48.65"N	04	0401	Bridge	95	0	0
CNCF000002	7°57'37.64"W	37°24'36.74"N	04	0404	Ford with coating	90	4010	4010
003	7°57'4.19"W	37°24'22.52"N	04	0404	Ford with coating	10	5440	1430
CNCF000004	7°55'54.07"W	37°24'21.37"N	04	0404	Ford with coating	10	8390	2950
[illegible]	7°55'16.94"W	37°24'37.92"N	04	0403	Ford	110	10055	1665
[illegible]	7°55'4.33"W	37°24'30.37"N	02	0203	Weir	10	10790	735
[illegible]	7°55'3.45"W	37°24'32.13"N	04	0404	Ford with coating	60	10840	50
[illegible]	7°54'7.33"W	37°24'46.79"N	04	0404	Ford with coating	60	13690	2850
[illegible]	7°53'35.61"W	37°25'51.49"N	04	0401	Bridge	95	18585	4895
[illegible]	7°52'38.85"W	37°25'56.44"N	02	0203	Weir	10	19620	1035
[illegible]	7°52'27.81"W	37°26'9.57"N	04	0403	Ford	110	20170	550
[illegible]	7°51'19.45"W	37°26'24.02"N	04	0403	Ford	110	22750	2580
[illegible]	7°51'24.67"W	37°26'43.65"N	04	0403	Ford	110	23410	660
[illegible]	7°51'22.85"W	37°26'47.80"N	04	0402	Culvert	10	23560	150
[illegible]	7°50'30.32"W	37°26'52.47"N	04	0404	Ford with coating	60	25030	1470
[illegible]	7°49'1.65"W	37°27'14.37"N	02	0203	Weir	10	29705	4675
[illegible]	7°48'52.88"W	37°27'18.58"N	04	0404	Ford with coating	35	30005	300
[illegible]	7°46'38.51"W	37°28'23.58"N	04	0404	Ford with coating	10	34790	4785
[illegible]	7°46'36.82"W	37°28'32.67"N	02	0203	Weir	10	35090	300
[illegible]	7°46'36.62"W	37°28'35.36"N	04	0401	Bridge	95	35175	85
[illegible]	7°44'43.12"W	37°29'10.74"N	04	0404	Ford with coating	60	40575	5400
[illegible]	7°42'14.19"W	37°29'57.09"N	02	0203	Weir	85	47305	6730
[illegible]	7°42'6.01"W	37°29'57.00"N	04	0401	Bridge	95	47505	200
[illegible]	7°42'4.11"W	37°29'57.35"N	04	0402	Culvert	60	47540	35
CNCF000025	7°41'23.67"W	37°30'6.08"N	02	0203	Weir	10	48640	1100
CNCF000026	7°41'17.66"W	37°30'9.09"N	04	0403	Ford	110	48860	220
CNCF000027	7°40'40.21"W	37°30'16.87"N	04	0403	Ford	110	50040	1180
CNCF000028	7°39'58.77"W	37°30'12.83"N	04	0403	Ford	110	51295	1255
CNCF000029	7°37'55.18"W	37°29'46.18"N	02	0203	Weir	85	56685	5390
CNCF000030	7°36'23.79"W	37°30'6.14"N	02	0203	Weir	10	60675	3990
CNCF000031	7°35'45.46"W	37°30'19.34"N	02	0203	Weir	10	62085	1410
CNCF000032	7°34'51.51"W	37°30'56.76"N	04	0403	Ford	10	65060	2975
CNCF000033	7°34'45.44"W	37°31'3.74"N	04	0401	Bridge	95	65370	310
CNCF000034	7°31'9.03"W	37°31'35.39"N	02	0203	Weir	85	74420	9050

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Survey, identification and evaluation of the "passability" of transversal barriers in river Vascão

Longitudinal connectivity was evaluated using the ICF Index (Solá *et al.*, 2011), a river connectivity índex developed for Catalan rivers

Espanha

CNCF000034
CNCF000033
CNCF000032
CNCF000031
CNCF000030
CNCF000029
CNCF000026
CNCF000027
CNCF000023
CNCF000025
CNCF000021
CNCF000020
CNCF000019
CNCF000018
CNCF000016
CNCF000014
CNCF000015
CNCF000011
CNCF000012
CNCF000009
CNCF000010
CNCF000002
CNCF000005
CNCF000008
CNCF000007
CNCF000004
000001

Alcoutim

Loulé

Score Range of ICF

- Bad
- Poor
- Moderate
- Good
- Very Good

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None of the bridges are barriers to migrating fish species

Some fords are semi-destroyed allowing, under certain flow conditions, the passage of fish

Type of barrier	Number					
BRIDGE	5	5				
FORD WITH COATING	9		1	4	1	3
FORD	8	7				1
CULVERT	2			1		1
WEIR	10		3			7
Total	34	12	4	5	1	12

Weirs were identified as total obstructions to fish passage. These are an exception because they are in ruins allowing fish passage.

Our first priority for fish passage recovery

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A ranking scheme for barrier sites was developed to determine remediation priorities for the improvement of fish passage in Vascão river.
Barriers were ranked as either high priority Level 1 (most of ICF ≤10), medium priority Level 2 (some ICF ≤10 and all ICF ≥25 e ≤49) and low priority Level 3 (ICF ≥50 e ≤74).

Remediation recommendations for barriers identified in the report included:

- complete or partial removal/replacement of structures
- permanent removal of obsolete or redundant structures
- modification of structures (retrofitting fords and installing fishpasses)
- maintenance of sites (removal of sediment and debris blockages)

COD BARRIER	TYPE CODE	SUBTYPE CODE	SUBTYPY NAME	ICF SCORE	PROPOSALS	PRIORITY RANKING
CNCF000003	04	0404	Ford with coating	10	Rehabilitation	2
CNCF000004	04	0404	Ford with coating	10	Rehabilitation	2
CNCF000006	02	0203	Weir	10	Removal / Nature-like fish pass	1
CNCF000007	04	0404	Ford with coating	60	Rehabilitation	3
CNCF000008	04	0404	Ford with coating	60	Rehabilitation	3
CNCF000010	02	0203	Weir	10	Removal / Nature-like fish pass	1
CNCF000014	04	0402	Culvert	10	Removal / Construction of bridge	1
CNCF000015	04	0404	Ford with coating	60	Rehabilitation	3
CNCF000016	02	0203	Weir and watermill	10	Construction of nature-like fish pass	1
CNCF000017	04	0404	Ford with coating	35	Rehabilitation	2
CNCF000018	04	0404	Ford with coating	10	Removal	1
CNCF000019	02	0203	Weir and watermill	10	Construction of nature-like fish pass	1
CNCF000021	04	0404	Ford with coating	60	Rehabilitation	3
CNCF000024	04	0402	Culvert	60	Removal	3
CNCF000025	02	0203	Weir and watermill	10	Construction of nature-like fish pass	1
CNCF000030	02	0203	Weir and ruins of watermill	10	Removal	1
CNCF000031	02	0203	Weir and ruins of watermill	10	Removal	1
CNCF000032	04	0403	Ford with coating	10	Removal	1

REMOVED

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CULVERT OF PESSEGUEIRO
CNCF000014

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In October 2021 the most important barrier for fish in Vascão river was removed
Replacement of part of the culverts by a bridge

The construction project was carried out by the national environmental agency APA in accordance with ICNF guidelines

DURING DEMOLITION

FUNDO AMBIENTAL

POSEUR PORTUGAL 2020

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The construction of the new bridge

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April 13, 2022

FUNDO AMBIENTAL

POSEUR PORTUGAL 2020 UNIÃO EUROPEIA Fundo de Coesão

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Thank you

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