



CASTOR
Project

Evrotas River Conservation



Conservation Actions for Supporting the Threatened freshwater fish of Evrotas River (CASTOR)

**«Report on initial habitat assessment for fish translocations based
on water quality, habitat suitability & connectivity»**

(a Synopsis)

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1. INTRODUCTION

The present document constitutes a synopsis of the deliverable “Report on initial habitat assessment for fish translocations based on water quality, habitat suitability and connectivity” of the project “CASTOR - Conservation Actions for Supporting the Threatened freshwater fish of Evrotas River”.

The CASTOR Project is funded by the **Donors’ Initiative for Mediterranean Freshwater Ecosystems (DIMFE)** and is implemented by **OIKOM Environmental Studies Ltd. (Coordinator)** in collaboration with the **Hellenic Centre for Marine Research / Institute of Marine Biological Resources and Inland Waters (HCMR/IMBRIW)** as the scientific lead.

The project’s aim is to safeguard the endemic and threatened freshwater fish species *Pelagius laconicus* and *Squalius keadicus* through a combination of **habitat restoration, population management, invasive species control, and stakeholder engagement actions** within the Evrotas River Basin.

1.1. Summary

This synopsis summarises the pre-translocation feasibility assessment undertaken to identify suitable release and source water bodies for the Evrotas chub *S. keadicus* and the Evrotas minnow *P. laconicus*. The assessment applied the REVIVE tool, developed specifically for freshwater-fish translocations in Mediterranean-type rivers, to ten candidate release water bodies in five reaches and four candidate source water bodies in the Evrotas main stem.

The evidence base combined fish surveys, environmental DNA (eDNA), physicochemical water quality, benthic diatoms, macroinvertebrates, habitat quantity and suitability, hydromorphological pressures, invasive-species occurrence and expert field assessment. The results were used to rank candidate sites, identify site-specific risks and potential mitigation measures, select provisional source populations and establish the initial translocation schedule.

Seven candidate release water bodies were retained for planned actions and three were excluded because their hydrological or morphological constraints were considered to create a high risk of poor population persistence. All four candidate source water bodies met the mandatory REVIVE requirements. The assessment also identifies preparatory actions concerning habitat improvement, connectivity, invasive-species surveillance, permits and stakeholder cooperation.

2. RATIONALE FOR THE COMPILATION OF THE MANUAL

Conservation translocations are increasingly used to reduce extinction risk and restore species within their historical ranges. Their success, however, depends on rigorous assessment before release, particularly in Mediterranean rivers where seasonal flow contraction, drought, habitat fragmentation and human water use can rapidly alter habitat availability.

- **Primary objective:** identify release habitats capable of supporting viable populations of both target species.
- **Source-population objective:** identify genetically and ecologically compatible populations that can provide founders without jeopardising their persistence.

- **Implementation objective:** define risks, mitigation needs, sourcing periods and actions required before the planned transfers.

3. TARGET SPECIES AND ASSESSMENT AREA

The target species are two threatened endemic cyprinids of the Evrotas basin: the Evrotas chub *Squalius keadicus* and the Evrotas minnow *Pelagius laconicus*. Both are classified as Endangered based on IUCN. They are adapted to the strongly fluctuating hydrology of the Evrotas and can persist in isolated pools during low-flow periods, although long-term survival and recruitment require adequate habitat quantity, water quality, hydraulic conditions and reproductive habitat.

The assessment covered five potential release reaches: Magoulitsa, Castor, Kardaris, Sofronis/Oinous and Skortsinos Springs. Ten individual candidate release water bodies were assessed: Knakion Springs, Wild Hog, Ag. Irene, KAS 1, KAS-FP1, Castor Dam, Castor National, US Kardaris, Ag. Anargyroi and Skortsinos Springs.

Four candidate source water bodies were assessed in the Evrotas main stem: Giakoumeika, Sedenikos, Gef-Spartis and the Skortsinos side channel. Giakoumeika and Gef-Spartis normally retain water during the dry season, whereas Sedenikos and the Skortsinos side channel can desiccate, trapping fish in residual pools and creating opportunities for rescue translocations before summer mortality.

REACH / SYSTEM	CANDIDATE RELEASE WATER BODIES	MAIN CHARACTERISTIC
Magoulitsa	Knakion Springs; Wild Hog; Ag. Irene	Perennial upper reaches
Castor	KAS 1; KAS-FP1; Castor Dam; Castor National	Strong seasonal variability
Kardaris	US Kardaris	Comparatively stable flow
Sofronis / Oinous	Ag. Anargyroi	Intermittent downstream reach
Upper Evrotas	Skortsinos Springs	Artificially modified spring pond

4. THE REVIVE FEASIBILITY ASSESSMENT FRAMEWORK

REVIVE evaluates two linked components. Candidate release water bodies are scored from -1 to +1 using eight criteria, while candidate source water bodies are screened through two mandatory ON/OFF criteria.

- **Release-water-body criteria:** current occurrence status, historical presence, habitat quality, habitat quantity, habitat suitability, hydromorphological perturbation, invasive-species pressure, and understanding and manageability of threats.
- **Source-water-body criteria:** genetic/evolutionary compatibility and the capacity to provide founders without compromising source-population viability.
- **Interpretation:** overall release-site scores above 0.50 indicate comparatively high feasibility; scores from 0 to 0.50 indicate low-to-moderate feasibility; negative scores indicate low feasibility.

Scoring used data collected in December 2025 and March and July 2026, complemented by previous HCMR records, scientific literature and expert site assessment. eDNA was used as complementary evidence for species detection and non-detection.

5. PRINCIPAL ASSESSMENT RESULTS

All ten candidate release water bodies received positive overall scores for both target species. For *S. keadicus*, scores ranged from 0.37 to 0.95, with eight sites exceeding the 0.50 high-feasibility benchmark. For *P. laconicus*, scores ranged from 0.26 to 0.95, again with eight sites above 0.50.

ASSESSMENT ELEMENT	MAIN FINDING
Water and biological quality	Physicochemical water quality was classified as high at all assessed release sites. Biological quality based on diatoms and macroinvertebrates was generally positive, with Skortsinos Springs showing the clearest limitation.
Habitat quantity	All candidate water bodies exceeded the reference reach length used as the minimum habitat-quantity benchmark and therefore received the maximum positive score.
Hydrological suitability	Most sites retained perennial flow. Castor National and Ag. Anargyroi partially dry during late summer, substantially increasing translocation risk.
Habitat suitability	Depth, flow, spawning substrate and trophic conditions were suitable overall, but several sites showed local deficiencies that require mitigation or species-specific release decisions.
Hydromorphological pressure	Castor National was strongly affected by abstraction and channel alteration. Skortsinos Springs was strongly modified and also lacked effective riparian shading.
Alien species	No alien fish were recorded in the candidate release water bodies during the pre-assessment fish surveys. Electrofishing and eDNA results were mutually supportive for rainbow-trout absence at these sites.

Invasive-species baseline

During the July 2026 campaign, 2,815 m² of wetted habitat were intensively surveyed and no *Oncorhynchus mykiss* was captured; approximately 1,995 m² of this area lay within candidate release water bodies. eDNA analyses also indicated trout absence at the candidate release and source sites. The positive signal at Ag. Mamas was interpreted in relation to the trout farm immediately upstream and served as the positive-control context for the assay.

These findings represent the baseline condition at the time of assessment. Continued surveillance remains necessary because escape events, illegal stocking or high-flow connectivity may enable future reinvasion.

6. RELEASE AND SOURCE WATER-BODY SELECTION

Seven release water bodies were retained after considering overall REVIVE scores, site-specific risks, feasible mitigation and expected population persistence. Three sites were excluded because the identified pressures could not be adequately alleviated before release.

SELECTED SITE	COURSE	CHUB / MINNOW SCORE	PROVISIONAL RELEASE	PERSISTENCE POTENTIAL
KAS 1	Castor	0.95 / 0.95	Chub + minnow	High
KAS-FP1	Castor	0.89 / 0.84	Chub + minnow	High
Castor Dam	Castor	0.69 / 0.59	Chub	Moderate-high
US Kardaris	Kardaris	0.90 / 0.89	Chub	High
Ag. Irene	Magoulitsa	0.89 / 0.87	Chub	High
Wild Hog	Magoulitsa	0.95 / 0.95	Chub + minnow	High
Knakion Springs	Magoulitsa	0.95 / 0.95	Chub + minnow	High

Sites not retained: Castor National was excluded because of flow intermittency and high hydrological and morphological perturbation; Ag. Anargyroi because of summer intermittency and the absence of a feasible hydrological mitigation measure; and Skortsinos Springs because of high morphological alteration, reduced riparian cover and consistently low pH.

Candidate source populations and sourcing timeline

SOURCE WATER BODY	SOURCE POPULATION	PROVISIONAL TIMING	RATIONALE
Giakoumeika	Chub + minnow	November 2026 and June 2027	Wild founders
Gef-Spartis	Chub + minnow	November 2026 and June 2027	Wild founders
Sedenikos	Chub + minnow	June 2027 before desiccation	Rescue translocation
Skortsinos side channel	Minnow	June 2027 before desiccation	Rescue translocation

All four source water bodies passed both mandatory REVIVE criteria. Founder sourcing will prioritise proximity and ecological compatibility, while disease/parasite screening and the risks associated with captive rearing will be considered. Laboratory-reared fish may supplement wild founders in cases to be defined during implementation.

7. PREPARATORY ACTIONS FOR TRANSLOCATIONS

A positive feasibility score does not by itself ensure translocation success. The report therefore defines preparatory actions that should be completed before, or coordinated with, the planned releases in November 2026 and June 2027 and, in all cases, before the critical 2027 low-flow period.

- **Invasive-species surveillance and response:** repeat electrofishing and targeted eDNA checks at release sites; immediately remove alien fish if detected; maintain attention to potential sources in Ag. Mamas and the upper Oinous system.

- **Habitat improvement:** increase structural complexity and shelter where necessary through appropriately designed boulders, large wood or riffle-pool features; improve depth and reproductive habitat at selected sites.
- **Connectivity restoration:** address small barriers and other structures that restrict upstream dispersal, using fish-passage or barrier-mitigation measures where ecologically and technically justified.
- **Water-quality and flow safeguards:** confirm low-flow conditions immediately before transfer, maintain pollution surveillance and avoid releases where temporary hydrological deterioration reduces habitat availability.
- **Biosecurity, animal health and permits:** apply disease and parasite precautions, secure all required authorisations, document handling and transport procedures, and preserve traceability for each founder group.
- **Stakeholder cooperation:** coordinate with local authorities, water users and communities to support access, logistics, habitat protection and prevention of illegal stocking or other reinvasion pathways.

8. HOW THE ASSESSMENT SUPPORTS CASTOR RESTORATION OUTCOMES

The assessment provides an evidence-based pathway from habitat screening to implementation. By combining species occurrence, water and biological quality, habitat suitability, hydromorphology, invasive-species risk and source-population resilience, it reduces the probability of releasing fish into habitats that cannot support establishment.

- **SG1 - Population recovery:** the selected release water bodies can increase the area of occupancy of both endangered endemic species and reduce reliance on a small number of drought refugia.
- **SG2 - Habitat and connectivity restoration:** site selection is explicitly linked with planned habitat improvements and barrier mitigation.
- **SG3 - Invasive-species control:** the trout-free baseline and continued surveillance reduce a major biological risk to native-fish recovery.
- **SG4 - Engagement and long-term stewardship:** stakeholder cooperation is incorporated into permitting, implementation and reinvasion prevention.

The selection remains provisional and should be confirmed through pre-release verification and adaptive post-release monitoring. Survival, dispersal, recruitment and habitat condition will determine whether founder numbers, release timing or habitat measures require adjustment.



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