Principles of Fish Introduction on the Basis of IUCN Criteria and an Example of Conservation Oriented Fish Introduction

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The Ruffor Small Grants Foundation
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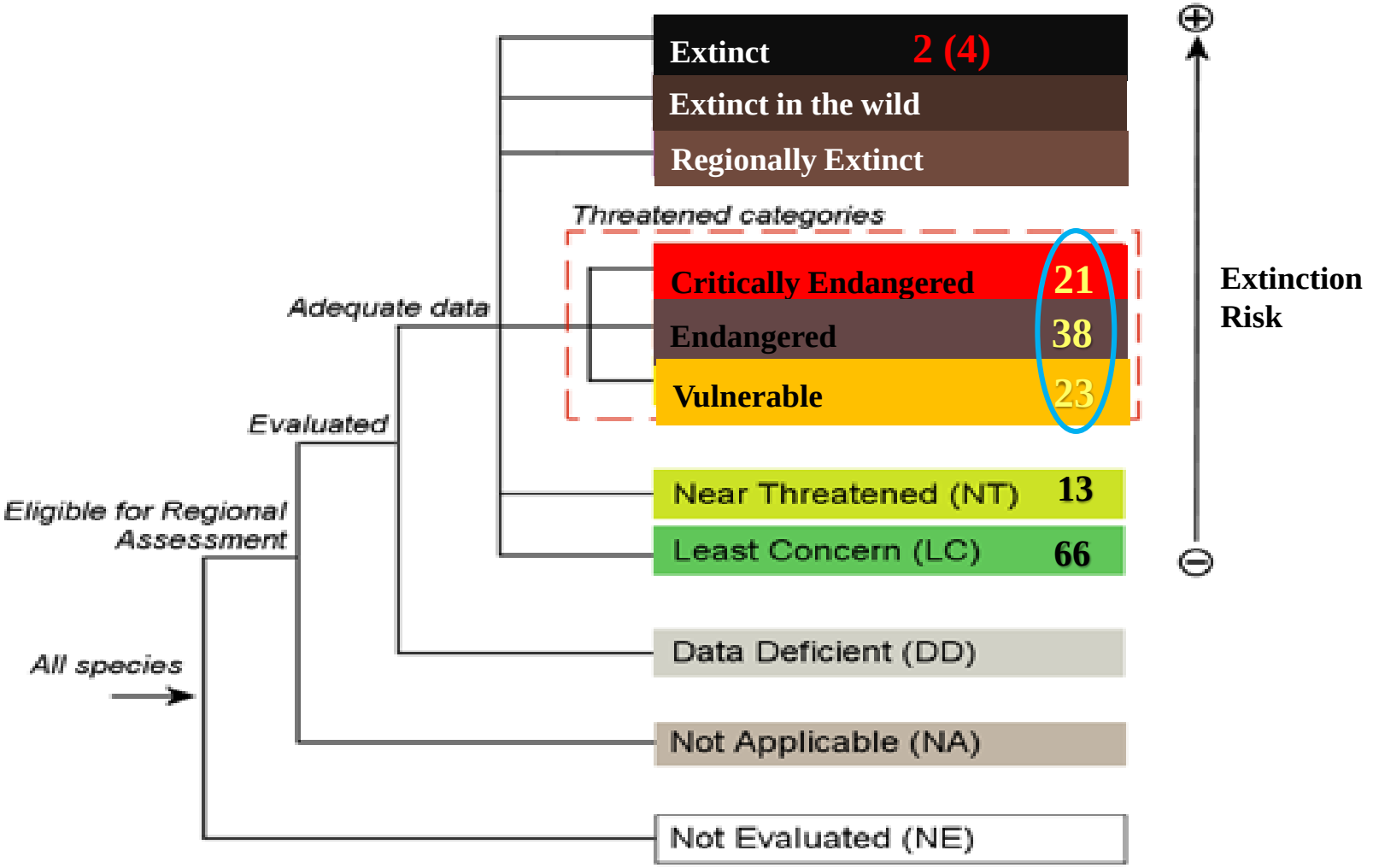
2. Fish Introduction and Reservoir Management Symposium 20-22 May 2015 EĞİRDİR-TURKEY


Extinct 2 (4)
Extinct in the wild
Regionally Extinct
Threatened categories
Critically Endangered 21
Endangered 38
Vulnerable 23
Near Threatened (NT) 13
Least Concern (LC) 66
Data Deficient (DD)
Not Applicable (NA)
Not Evaluated (NE)
Adequate data
Evaluated
Eligible for Regional Assessment
All species
Extinction Risk

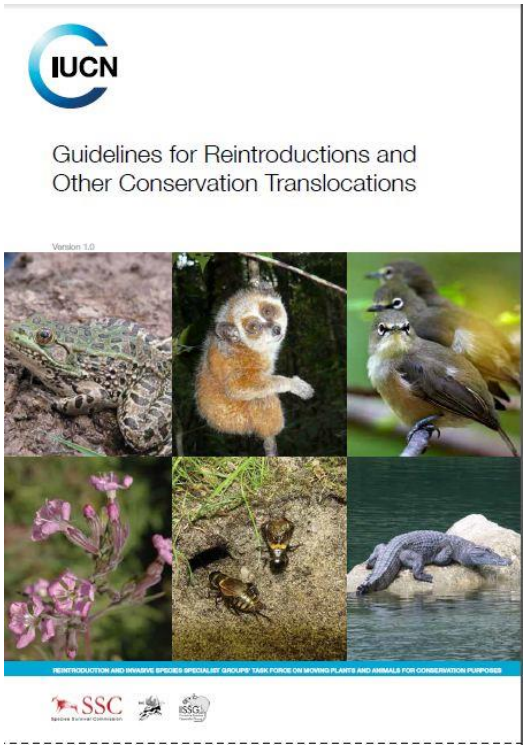
Threatened vertebrates in Turkey *

Threat Category	Freshwater Fish	Amphibians	Birds	Mammals
EX	2(4)*	-	-	-
CR	21	2	3	1
EN	38	5	5	5
VU	23	4	8	11
NT	13	5	16	11
LC	66	12	358	115
DD	9	1	-	8
TOTAL	%47	%38	%0,04	%0,11

* IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2. <www.iucnredlist.org>. Downloaded on 21 January 2014.

Method

- The purpose is to make common policies among contries
- IUCN guidelines for reintroductions and other conservation translocations
- IUCN/SSC Guidelines for re-introductions



Definitions of Terms

- **Re-introduction”** : is the intentional movement and release of an organism inside its indigenous range from which it has disappeared.
- **Translocation”**: Deliberate and mediated movement of wild individuals or populations from one part of their range to another.
- **“Re-inforcement/Supplementation”** : addition of individuals to an existing population of conspecifics.
- **“Conservation/Benign Introductions”** an attempt to establish a species, for the purpose of conservation, outside its recorded distribution but within an appropriate habitat and ecogeographical area. This is a feasible conservation tool only when there is no remaining area left within a species' historic range.

The purpose of Conservation/Benign Introductions

- to establish a viable, free-ranging population in the wild, of a species, subspecies or race, which has become globally or locally extinct, or extirpated, in the wild.

The objectives of Conservation/Benign Introductions

- to enhance the long-term survival of a species,
- to re-establish a keystone species (in the ecological or cultural sense) in an ecosystem,
- to maintain and/or restore natural biodiversity,
- to provide long-term economic benefits to the local and/or national economy;
- to promote conservation awareness;

Pre-Project Activities

SOCIO-ECONOMIC AND LEGAL REQUIREMENTS

- Ensuring longterm financial and political support.
- Assessing impacts, costs and benefits of the reintroduction programme to local human populations.
- Providing locals to adopt and support the project.
- measures should be taken to minimise the risks caused from possible human activities.

BIOLOGICAL

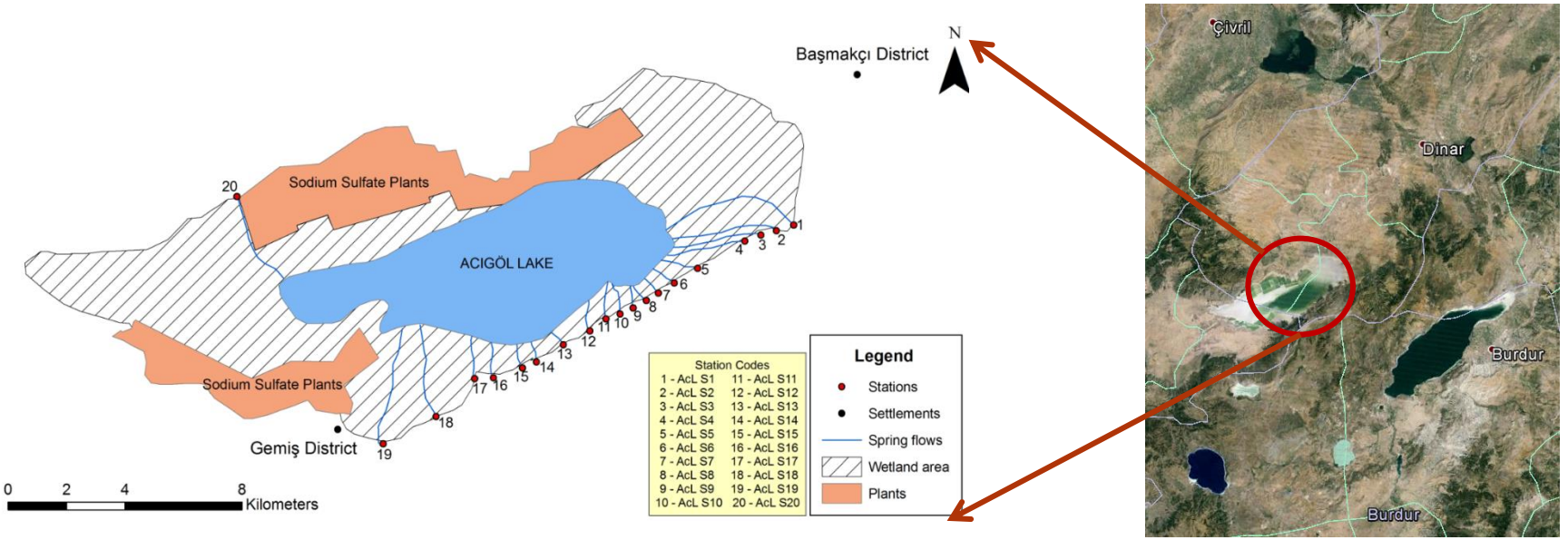
- Feasibility study and background research
- Assessing Previous Re-introductions
- Choice of release site and type
- Evaluation of re-introduction site
- Availability of suitable release stock

Aphanius species in Anatolia with their Red List category according to IUCN (IUCN, 2015).

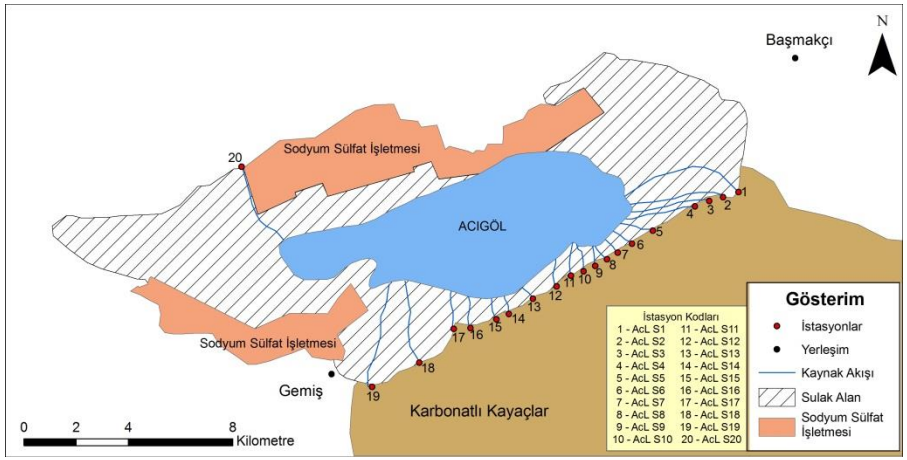
Species	Known Distribution Range in Turkey	IUCN Status
Aphanius asquamatus	Hazar Lake (Elazığ)	LC
Aphanius villwocki	Upper Sakarya Basin	LC
Aphanius anatoliae	Central Anatolia and Tuz Lake Basin	NT
Aphanius sureyanus	Burdur Lake (Burdur)	EN
Aphanius danfordii	Sultan Marshes – Develi (Kayseri)	CR
Aphanius transgrediens	Acıgöl Springs (Denizli – Afyon)	CR
Aphanius splendens	Gölcük Crater Lake (Isparta)	EX
Aphanius fontinalis	Salda and Yarışlı Lakes (Burdur)	NE
Aphanius iconii	Eğirdir and Kovada Lakes (Isparta)	NE
Aphanius meandricus	Upland Greater Meander River Basin	NE
Aphanius meridionalis	Inner Southwest Anatolia	NE
Aphanius saldae	Salda Lake (Burdur)	NE
Aphanius marassantensis	Kızılırmak Basin	NE
*Aphanius mento**	Mediterrenaen Coasts	LC
*Aphanius fasciatus**	Lagoons in the Mediterranean and Aegean Coasts	LC

Feasibility study and background research

- Bio-ecological studies



Feasibility study and background research



	Temperature (C˚) Mean ± Sd (Min-Max)	Sal (ppt) Mean ± Sd (Min-Max)
Acl S7	21,0 ± 0,2 (20,7-21,5)	0,90 ± 0,05 (0,77-0,93)
Acl S10	20,5 ± 0,1 (20,1-20,6)	0,76 ± 0,05 (0,66-0,8)
Acl S11	19,7 ± 0,1 (19,4-19,8)	0,67 ± 0,04 (0,6-0,71)
Acl S12	21,7 ± 0,3 (21,1-22)	0,66 ± 0,05 (0,58-0,74)
Acl S15	19,1 ± 1,9 (15,8-21)	0,88 ± 0,06 (0,76-0,94)
Acl S20	**17,2 ± 5,5 (11-25,9)**	**12,6 ± 13,8 (0,54-30,62)**

Station	*Aphanius transgrediens* (%)	*G. holbrooki* (%)
AcL S1	None	100
AcL S2	None	100
AcL S3	None	100
AcL S4	None	100
AcL S5	None	100
AcL S6	None	100
AcL S7	5	95
AcL S8	None	100
AcL S9	None	100
AcL S10	10	90
AcL S11	70	30
AcL S12	40	60
AcL S13	None	100
AcL S14	None	100
AcL S15	1	99
AcL S16	None	100
AcL S17	None	100
AcL S18	None	100
AcL S19	None	100
AcL S20	90	10

Feasibility study and background research

(Hydrogeological Properties of the Area)

Precipitation	Evaporation	Surface runoff	Infiltration	Water amount gained by the Lake
63.72 x 10^6 m^3	45 x 10^6 m^3	9.16 x 10^6 m^3	9.56 x 10^6 m^3	18.66 x 10^6 m^3

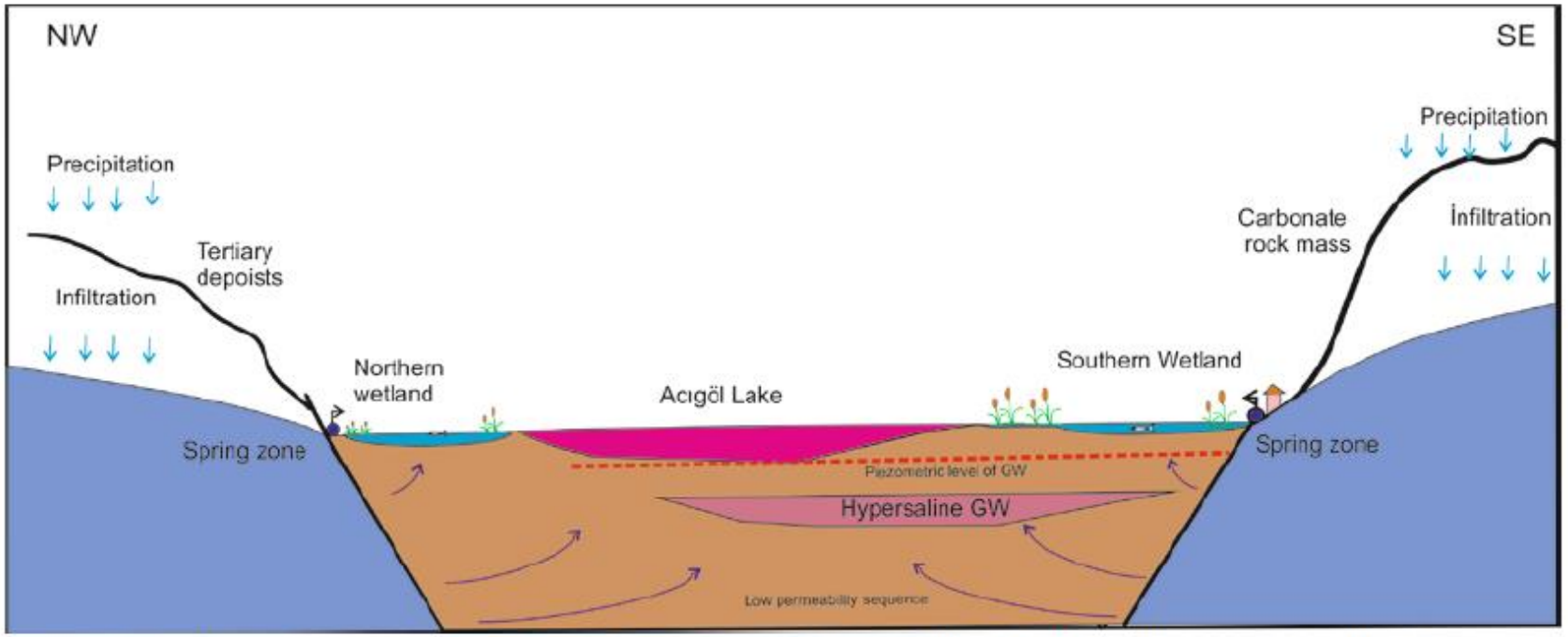


Figure 1: Schematic representation of the conceptual model of the hydrogeological system.

Before re-introduction (Some reproduction parameters)

After 2 weeks of acclimation and maintenance, some male individuals started to exhibit mating behavior and their color turned to darker and brighter pattern. Spawning occurred within two days from this observation. The findings about hatching success, average hatching time and batch size per female is depicted in Table 2. In addition, egg development is demonstrated in Figure 10.

Table 2. Some spawning parameters of *Aphanius transgrediens*

N	Hatching success (%)	Av. Hatching Day (Min-Max) - Day	Batch size per female (Min-Max)
66	63,6	7,66 (6-10)	7,75 (11-5)

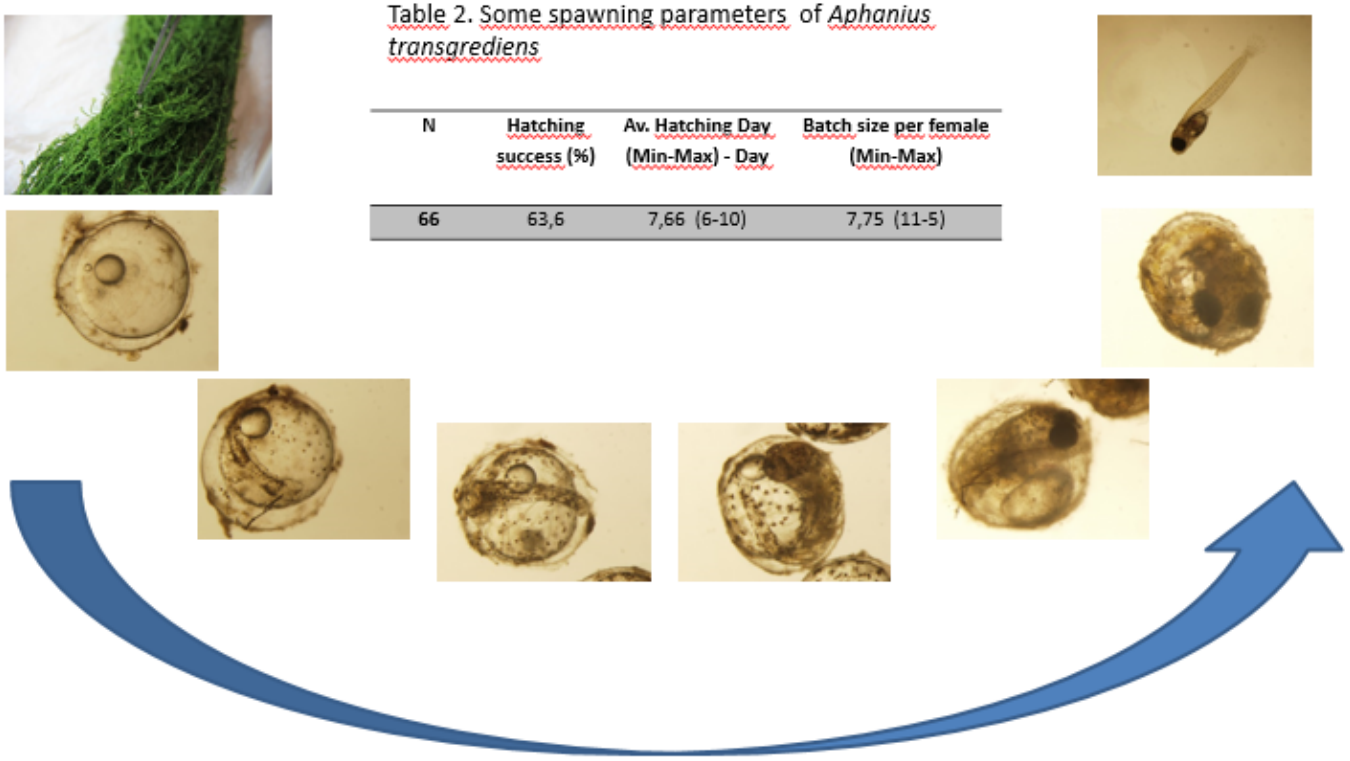


Figure 11. Egg development of *Aphanius transgrediens*

Before re-introduction (Choice of release site and type)

- Sheltered
- Easy Accessible
- Free from invasive species

Before re-introduction

- A re-introduction requires a multidisciplinary approach involving a team of persons drawn from a variety of background.
  - Hydrobiology
  - Hydrogeology
  - Aquaculture Engeneer.
  - GIS and Modelling experts
  - Government personnel
  - Non-governmental organisations
- Defining success indicators and predicting duration of the programme.
- Securing adequate funding
- Planning post-release monitoring programme

SOCIO-ECONOMIC AND LEGAL REQUIREMENTS

- Approval of relevant government agencies and land owners, and coordination with national and international conservation organizations.

T.C.
GIDA TARIM VE HAYVANCILIK BAKANLIĞI
Balıkçılık ve Su Ürünleri Genel Müdürlüğü

Sayı : 67852565/140.03.03- 1515 .../ 06/2013
Konu : Araştırma İzni

HACETTEPE ÜNİVERSİTESİ
FEN FAKÜLTESİ
BİYOLOJİ BÖLÜMÜ
(Prof.Dr.Güler EKMEKÇİ)

27.06.13

İlgi: 27.06.2013 tarih ve 8860025/150-2310 sayılı Hacettepe Üniversitesi Genel Sekreterliği'nin yazısı.

Hacettepe Üniversitesi Fen Fakültesi Biyoloji Bölümü Öğretim üyelerinden Prof. Dr. F.Güler EKMEKÇİ'nin proje yöneticiliğinde yürütülmekte olan "**Endemik bir balık türü olan *Aphanius transgradiensin* ve diğer *Aphanius* türlerinin korunması**" konulu araştırma projesinin arazi çalışmalrı için yasal izin talep eden ilgi yazı v ekleri incelenmiştir

Söz konusu proje kapsamında; **Prof.Dr.Güler EKMEKÇİ, Yrd.Doç.Dr. Şerife Gülsün KIRANKAYA ve Araş.Gör.Baran YOĞURTÇUOĞLU** isimli araştırmacıların katılımları ile **Denizli, Afyon, Uşak, Isparta, Burdur, Elazığ, Bursa ve Yalova** illerinde bulunan göller ve akasularda, **01 Temmuz 2013 – 31 Aralık 2014** tarihleri arasında, **elektroşoker ve uzatma ağları** kullanılarak, 5m.ye kadar olan derinliklerden, her ay **yirmi (20) adet** örnek alınmasına;

Çalışmaların yapılacağı günlerin; çalışma bölgesinde bulunan Gıda, Tarım ve Hayvancılık İl Müdürlükleri'ne önceden bildirilmesi, İl Müdürlükleri'nde görevli bir personelin proje çalışmalarına katılması, "3/1 ve 3/2 No'lu Su Ürünleri Avcılığını Düzenleyen Tebliğ'lerde belirtilen hükümlere riayet edilmesi, **elde edilen su ürünlerinin hiçbir suretle satılmaması ve yurtdışına çıkartılmaması, çalışmalara yabancı araştırmacının katılmaması ve proje çalışma sonuçlarının Bakanlığımıza** gönderilmesi şartlarına uyulması kaydı ile uygun görülmüştür.

Bilgilerinizi ve gereğini rica ederim.

Dr. Durali KOÇAK
Bakan a.
Genel Müdür

DAĞITIM:
Gereği:
- Afyon, Bursa, Burdur,
- Denizli, Elazığ, Isparta,
  Uşak, YalovaValilikleri (İl Müd.)
- Hacettepe Ünv. Fen Fak. Biy.Böl.

Bilgi:
- İçişleri Bakanlığı
  (Jandarma Genel Komutanlığı)

Our Field Study Permission

T.C.
GIDA TARIM VE HAYVANCILIK BAKANLIĞI
Balıkçılık ve Su Ürünleri Genel Müdürlüğü

14.08.13 03406

Sayı : 67852565/140.03.03- **2313**
Konu : Araştırma İzni

HACETTEPE ÜNİVERSİTESİ
Fen Edebiyat Fakültesi
Biyoloji Bölümü
Beytepe/ANKARA

İlgi: Hacettepe Üniversitesi'nin 30.07.2013 tarih ve 88600825-150-2680 sayılı yazısı.

Hacettepe Üniversitesi Fen Fakültesi Biyoloji Bölümü Öğretim Üyelerinden Prof.Dr.F.Güler EKMEKÇİ tarafından yürütülecek **"Kritik Düzeyde Tehlike Altında Olan Hassas ve İstila Edilmiş Bir Habitatta Yaşayan Endemik Acıgöl Dişlisazancığı *(Aphanius transgrediens)* Türünün Korunması"** konulu araştırma projesinin arazi çalışmaları için yasal izin talep eden ilgi yazı ve ekleri incelenmiştir.

Söz konusu proje kapsamında; **Prof.Dr.F.Güler EKMEKÇİ ve Araş.Gör.Baran YOĞURTÇUOĞLU** isimli araştırıcıların katılımları ile **Eylül-Ekim 2013** tarihleri arasında, Acıgöl'ün Sodaş İşletmesi civarındaki su kaynaklarından, **kıyıdan uzatma ağı ve kepçe** kullanılarak, **500 (beşyüz) adet** erkek ve dişi Acıgöl Dişlisazancığı toplanarak Afyonkarahisar – Başmakçı bölgesinde bulunan korunaklı doğal üreme alanlarına taşınmasına,

Çalışmaların yapılacağı ve ürünlerin nakledileceği günlerin, bölgede bulunan Gıda, Tarım ve Hayvancılık İl Müdürlükleri'ne önceden bildirilmesi, İl Müdürlükleri'nde görevli bir personelin proje çalışmalarına katılması, "3/1 ve 3/2 No'lu Su Ürünleri Avcılığını Düzenleyen Tebliğ'lerde belirtilen hükümlere riayet edilmesi, **elde edilen su ürünlerinin hiçbir suretle satılmaması ve yurtdışına çıkartılmaması, çalışmalara yabancı araştırmacının katılmaması ve proje çalışma sonuçlarının Bakanlığımıza** gönderilmesi şartlarına uyulması kaydı ile uygun görülmüştür.

Bilgilerinizi ve gereğini rica ederim.

Dr. Durali KOÇAK
Bakan a.
Genel Müdür

DAĞITIM:
Gereği:
-Afyon, Denizli Val. (İl Müd)
- Hacettepe Üniversitesi
(Biyoloji Bölümü)

Bilgi:
- İçişleri Bakanlığı
(Jandarma Genel Komutanlığı)

Our Fish Translocation Permission

SOCIO-ECONOMIC AND LEGAL REQUIREMENTS

- Evaluating and/or determining threatening category of the species according to IUCN criteria

Aphanius transgrediens

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

Summary | Classification Schemes | Images & External Links | Bibliography | Full Account

Taxonomy
Assessment Information
Geographic Range
Population
Habitat and Ecology
Threats
Conservation Actions

View Printer Friendly

Taxonomy [top]

Kingdom	Phylum	Class	Order	Family
ANIMALIA	CHORDATA	ACTINOPTERYGII	CYPRINODONTIFORMES	CYPRINODONTIDAE

Scientific Name:	*Aphanius transgrediens*
Species Authority:	(Ermin, 1946)
Common Name(s): English – Aci Göl Toothcarp	
Synonym(s):	*Turkichthys transgrediens* Ermin, 1946

Assessment Information [top]

Red List Category & Criteria:	Critically Endangered B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v) ver 3.1
Year Published:	2014
Date Assessed:	2013-03-12
Assessor(s):	Freyhof, J.
Reviewer(s):	Ekmekçi, F., Küçük, F. & Smith, K.

- Evaluating the species according to national standards
  - *Aphanius transgrediens* has been registered as of top priority species to the T. R. Ministry of Forestry and Water Affairs by us.

PLANNING, PREPARATION AND RELEASE STAGES

- Development of transport plans for delivery of stock to the country and site of reintroduction, with special emphasis on ways to minimize stress on the individuals during transport.

- Development of conservation education for long-term support; professional training of individuals involved in the long-term programme; public relations through the mass media and in local community; involvement where possible of local people in the programme.

PLANNING, PREPARATION AND RELEASE STAGES

- If release stock is wild-caught, care must be taken to ensure that;
  - the stock is free from infectious or contagious pathogens and parasites before shipment,
  - the stock will not be exposed to vectors of disease agents which may be present at the release site
  - If vaccination prior to release, against local endemic or epidemic diseases of wild stock or domestic livestock at the release site, is deemed appropriate, this must be carried out during the "Preparation Stage" so as to allow sufficient time for the development of the required immunity.

- Populations of *Aphanius transgrediens* were monitored approximately 1.5 year. Dark colored, suitable transporting cages were used, conditions of stressful environment minimized. All *Aphanius* individuals were treated with appropriate conservatives and infection killers against transmissible agents.

POST-RELEASE ACTIVITIES

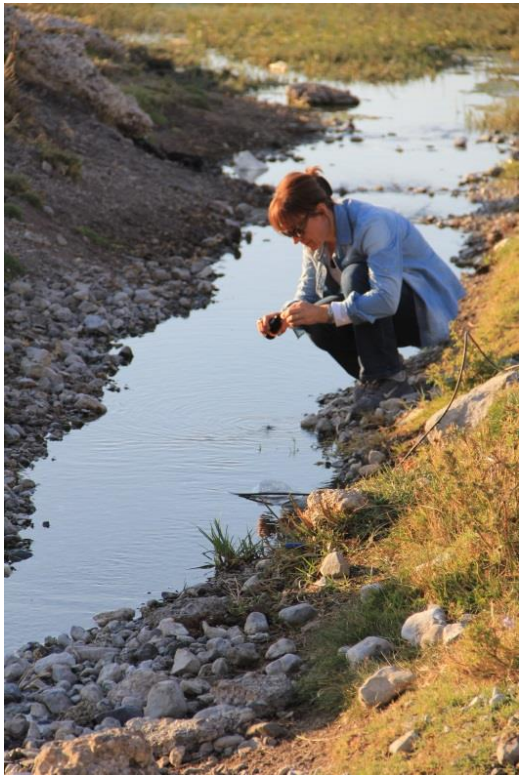
- Post release monitoring is required of all (or sample of) individuals. This most vital aspect may be by direct (e.g. tagging, telemetry) or indirect (e.g. spoor, informants) methods as suitable.
- Demographic, ecological and behavioural studies of released stock must be undertaken. (Are they reproducing?)
- Habitat protection or restoration to continue where necessary.
- Continuing public relations activities, including education and mass media coverage.
- Evaluation of cost-effectiveness and success of re- introduction techniques.
- Regular publications in scientific and popular literature.

Before re-introduction (Environmental Education)

Releasing (Collecting fish from wild stocks)

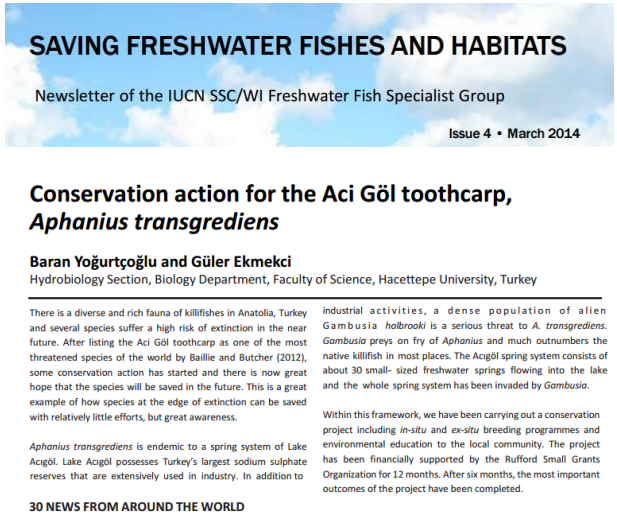
Releasing

- Participating of local authorities
- Fish acclimization



Post-release stage

- Monitoring (Monthly routine controls)
- Environmental Education
- Continuing public relations activities, including education and mass media coverage.
- Assessing and publishing the results



SAVING FRESHWATER FISHES AND HABITATS

Newsletter of the IUCN SSC/WI Freshwater Fish Specialist Group

Issue 4 • March 2014

Conservation action for the Aci Göl toothcarp, *Aphanius transgrediens*

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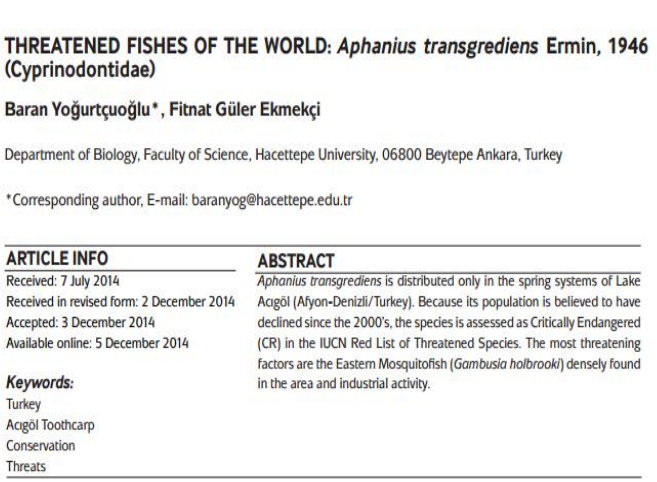
There is a diverse and rich fauna of killifishes in Anatolia, Turkey and several species suffer a high risk of extinction in the near future. After listing the Aci Göl toothcarp as one of the most threatened species of the world by Baillie and Butcher (2012), some conservation action has started and there is now great hope that the species will be saved in the future. This is a great example of how species at the edge of extinction can be saved with relatively little efforts, but great awareness.

Aphanius transgrediens is endemic to a spring system of Lake Acıgöl. Lake Acıgöl possesses Turkey's largest sodium sulphate reserves that are extensively used in industry. In addition to industrial activities, a dense population of alien Gambusia *holbrooki* is a serious threat to *A. transgrediens*. *Gambusia* preys on fry of *Aphanius* and much outnumbers the native killifish in most places. The Acıgöl spring system consists of about 30 small- sized freshwater springs flowing into the lake and the whole spring system has been invaded by *Gambusia*.

Within this framework, we have been carrying out a conservation project including *in-situ* and *ex-situ* breeding programmes and environmental education to the local community. The project has been financially supported by the Rufford Small Grants Organization for 12 months. After six months, the most important outcomes of the project have been completed.



THREATENED FISHES OF THE WORLD: *Aphanius transgrediens* Ermin, 1946 (Cyprinodontidae)

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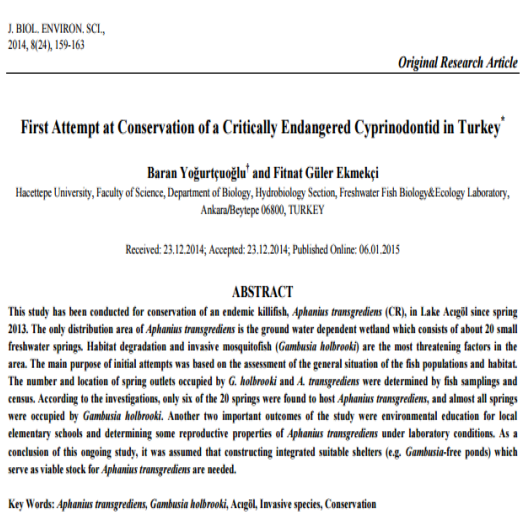
ABSTRACT
Aphanius transgrediens is distributed only in the spring systems of Lake Acıgöl (Afyon-Denizli/Turkey). Because its population is believed to have declined since the 2000's, the species is assessed as Critically Endangered (CR) in the IUCN Red List of Threatened Species. The most threatening factors are the Eastern Mosquitofish (*Gambusia holbrooki*) densely found in the area and industrial activity.



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Original Research Article

First Attempt at Conservation of a Critically Endangered Cyprinodontid in Turkey*

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ABSTRACT
This study has been conducted for conservation of an endemic killifish, *Aphanius transgrediens* (CR), in Lake Acıgöl since spring 2013. The only distribution area of *Aphanius transgrediens* is the ground water dependent wetland which consists of about 20 small freshwater springs. Habitat degradation and invasive mosquitofish (*Gambusia holbrooki*) are the most threatening factors in the area. The main purpose of initial attempts was based on the assessment of the general situation of the fish populations and habitat. The number and location of spring outlets occupied by *G. holbrooki* and *A. transgrediens* were determined by fish samplings and census. According to the investigations, only six of the 20 springs were found to host *Aphanius transgrediens*, and almost all springs were occupied by *Gambusia holbrooki*. Another two important outcomes of the study were environmental education for local elementary schools and determining some reproductive properties of *Aphanius transgrediens* under laboratory conditions. As a conclusion of this ongoing study, it was assumed that constructing integrated suitable shelters (e.g. *Gambusia*-free ponds) which serve as viable stock for *Aphanius transgrediens* are needed.

Key Words: *Aphanius transgrediens, Gambusia holbrooki*, Acıgöl, Invasive species, Conservation

Overall Assessment

- Gains
  - Population structures and biological properties of the species were revealed.
  - Determining ecological requirements of the species.
  - Assessing the habitat
  - Raising the awareness of public
  - Molding Public Opinion
  - Introduction of the subject to large masses and academic community
- Shortcomings
  - Not to secure the funding
  - Conservation genetics studies


Thanks for listening…
EĞİRDİR - April 2015