

Proteus anguinus

Taxonomic Authority: Laurenti, 1768

Synonyms:

Region: 10

Common Names:

Olm	English
proteo	Italian
Proteus	English

Order: Caudata

Family: Proteidae

Notes on taxonomy: Most populations are assigned to the subterranean subspecies *Proteus anguinus anguinus*. Unlike the nominate form, the genetically similar subspecies *P. a. parkelj* from Bela Krajina in Slovenia is pigmented.

General Information

Biome Terrestrial Freshwater Marine

Geographic Range of species:

The species is restricted to subterranean aquatic habitats within the Dinaric Alps. From southern Slovenia and adjoining northeast Italy through coastal Croatia and western Bosnia. It has yet to be officially recorded in western parts of Montenegro despite considerable anecdotal evidence of its presence (Kalezic and Dzukic, 2001). The species has been introduced to a cave of the subterranean laboratory of the CNRS France in the Pyrenees (C. Miaud, pers. comm.), and at least one of the northeastern Italian populations is introduced (P. Edgar, pers. comm.).

Habitat and Ecology Information:

The species generally occurs in large subterranean aquatic karst systems formed in limestone and dolomite rocks, and may be found in cave entrances (especially during episodes of high rainfall and flooding) and abandoned mine workings. Many of the cave that the species occurs in are connected to rivers that run above ground for the first 50 to 100km and then disappear into the ground. Populations may be found close to the surface or as much as 300m underground depending on the thickness of the Karstic formation. The species is found in waters ranging from 5°C to 15°C. Animals feed on detritus and endemic cave invertebrates and hide in crevices or bottom sediment when disturbed. In contrast to the nominate subspecies, *P. a. parkelj* is found in warmer surface waters. The species is long-lived (they are not sexually mature until they are 12 years of age) and reproduce very slowly. Females may lay approximately seventy individual eggs on the undersides of aquatic stones, however in some cases the eggs are retained within the body and two fully formed young are produced.

Conservation Measures:

It is listed on Appendix II of the Berne Convention, and on Annexes II and IV of the EU Natural Habitats Directive. It is recorded in the Slovenian National Red List and is protected by national legislation in both Slovenia and Italy. In Slovenia the species is present in caves, which are protected by national legislation, and much of the distribution of this species is within proposed national or international protected areas (Kocevski and Kraski regional parks; NATURA 2000 sites). In Italy it is found in the Riserva Naturale Regionale dei Laghi di Doberdò e Pietrarossa. The subspecies *P. a. parkelj* is in need of protection as its habitat is limited to only a few holes in connection with subterranean networks in a very small geographic area; this subspecies is very different from the nominate taxon and might be considered as a full species in the future.

Threats:

The main threats to this species are changes to the forested and pastoral land above the subterranean systems, largely through tourism, economic changes and increasing water pollution. These changes have a direct influence of the quality of the habitat available to the species. The species is highly dependent on clean water, and is therefore very susceptible to pollution. Other localised threats to this species may be water abstraction and hydroelectric schemes. There is some illegal collection of this species for the pet trade, but the extent of this is unknown.

Species population information:

There is little information available on the abundance of this species, but it is apparently most common in Slovenia and Croatia. A decline has been observed in the populations of Goriza (Italy) and Postojna (Slovenia) (Gasc et al., 1997). The number of individuals of the subspecies *P. a. parkelj* is very low.

Country Distribution

	Native - Presence Confirmed	Native - Presence Possible	Extinct	Reintroduced	Introduced	Vagrant
Bosnia and Herzegovina	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Croatia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
France	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Italy	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Slovenia	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Serbia and Montenegro	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

FAO Marine Habitats

Native - Presence Confirmed	Native - Presence Possible	Extinct	Reintroduced	Introduced
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Major Lakes

Major Rivers

Upper Level Habitat Preferences

	Score
5.18 Wetlands (inland) - Karst and Other Subterranean Hydrological Systems (inland)	1
12.1 Artificial/Aquatic - Karst and Other Subterranean Hydrological Systems (human-made)	1

Score

Lower Level Habitat Preferences

Score

Major threats

Code	Description of threat	Past	Present	Future
1	Habitat Loss/Degradation (human induced)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.1	Agriculture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.1.1	Crops	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.1.1.3	Agro-industry farming	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.3	Extraction	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.3.3	Wood	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.3.3.2	Selective logging	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.4	Infrastructure development	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.4.2	Human settlement	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1.4.3	Tourism/recreation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	Pollution (affecting habitat and/or species)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.3	Water pollution	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.3.1	Agriculture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6.3.3	Commercial/Industrial	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	Intrinsic factors	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9.9	Restricted range	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	Human disturbance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10.1	Recreation/tourism	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Conservation Measures

Code	Conservation measures	In place	Needed
1	Policy-based actions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2	Legislation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.1	Development	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.1.1	International level	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.1.2	National level	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.2	Implementation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.2.1	International level	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1.2.2.2	National level	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Communication and Education	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.2	Awareness	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Research actions	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.1	Taxonomy	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.2	Population numbers and range	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.4	Habitat status	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.5	Threats	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.8	Conservation measures	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.9	Trends/Monitoring	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Habitat and site-based actions	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.1	Maintenance/Conservation	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.2	Restoration	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.4	Protected areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.4.1	Identification of new protected areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.4.2	Establishment	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.4.3	Management	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Utilisation of Species

Purpose/Type of Use	Subsistence	National	International	Other purpose:		
13. Pets/display animals, horticulture	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Primary forms removed from the wild	100%	>75%	51-75%	26-50%	<25%	Other forms removed from the wild:
1. Whole animal/plant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Source of specimens in commercial trade	100%	>75%	51-75%	26-50%	<25%	Other source of specimens:
Wild	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Trend in wild offtake/harvest in relation to total wild population numbers over last five years:	Unknown					
Trend in offtake/harvest produced through domestication/cultivation over last five years:						
CITES:	Not listed					

Red Listing

Red List Assessment: Vulnerable (VU)

Possibly Extinct

Red List Criteria: B2ab(ii,iii,v)

Rationale for the Red List Assessment: Listed as Vulnerable because its Area of Occupancy is less than 2,000 km², its distribution is severely fragmented, and there is continuing decline in the extent and quality of its habitat, and in the number of mature individuals.

Current Population Trend: Decreasing

Date of Assessment: 12/17/2004

Assessor(s): Jan Willem Arntzen, Mathieu Denoël, Claude Miaud, Franco Andreone, Milan Vogrin, Paul Edgar, Jellka Crnobrnja Isailovic, Rast

Notes on Red listing: The subspecies *Proteus a. parkelj* is restricted to two locations, in an area totalling probably less than 10 km². It probably qualifies for listing as Critically Endangered under criterion B2ab(iii,v).

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