

THE WOLF BARB

RESEARCH STUDY FACT SHEET

Scientific Name: *Luciocyprinus striolatus*

IUCN Status: Endangered

HABITAT: The wolfbarb (*Luciocyprinus striolatus*), also known as the **monkey-eating fish**, is a top predatory cyprinid species that inhabits remote streams in Lao PDR with relatively clear, fast-flowing water and deep pools. They are typically found in locations with large boulders and bedrock substrates and require very good water quality conditions including low water temperatures (12.58-21.8°C) and adequate water flow (0.3-0.9 m/s) and dissolved oxygen (10-14 mg/L).

This species is considered a keystone species, which means that it serves as an indicator of the health of river ecosystems. In Laos, this species is known by multiple different local names. The name “Pakouan” is used in Oudomxay Province, and the names “Pakang,” “Pasak,” and “Pakouanxay” are used in central Laos (Bolikhamxay and Khammouane provinces).

REPRODUCTION AND LIFE CYCLE: Wolfbarb move around to search for prey and lay their eggs. However, with the construction of more hydropower dams throughout rivers in the region, it is becoming more difficult for them to migrate seasonally. As a result, the population is believed to have decreased in recent years, and only small numbers appear in remote areas located in the headwaters of Mekong River tributaries.

DISTRIBUTION: This fish is rare and difficult to find, however, wolfbarb have been recently observed in the Nam Theun and Nam Gnouang drainages. Other populations of the species are known to exist in the upper Xe Kong, Nam Ngiep, and Nam Ou - Nam Phak River basin in Laos, as well as in Xishuangbanna Prefecture in Yunnan, China (Kottelat, M. 2016).

| Location | Number of Fish | Number of Fish |
|------------------------------|----------------|----------------|
| 1. Nam Theun National Park | 100,000 | 100,000 |
| 2. Nam Gnouang National Park | 100,000 | 100,000 |
| 3. Nam Ou National Park | 100,000 | 100,000 |
| 4. Nam Phak National Park | 100,000 | 100,000 |
| 5. Nam Ngiep National Park | 100,000 | 100,000 |
| 6. Nam Xe Kong National Park | 100,000 | 100,000 |

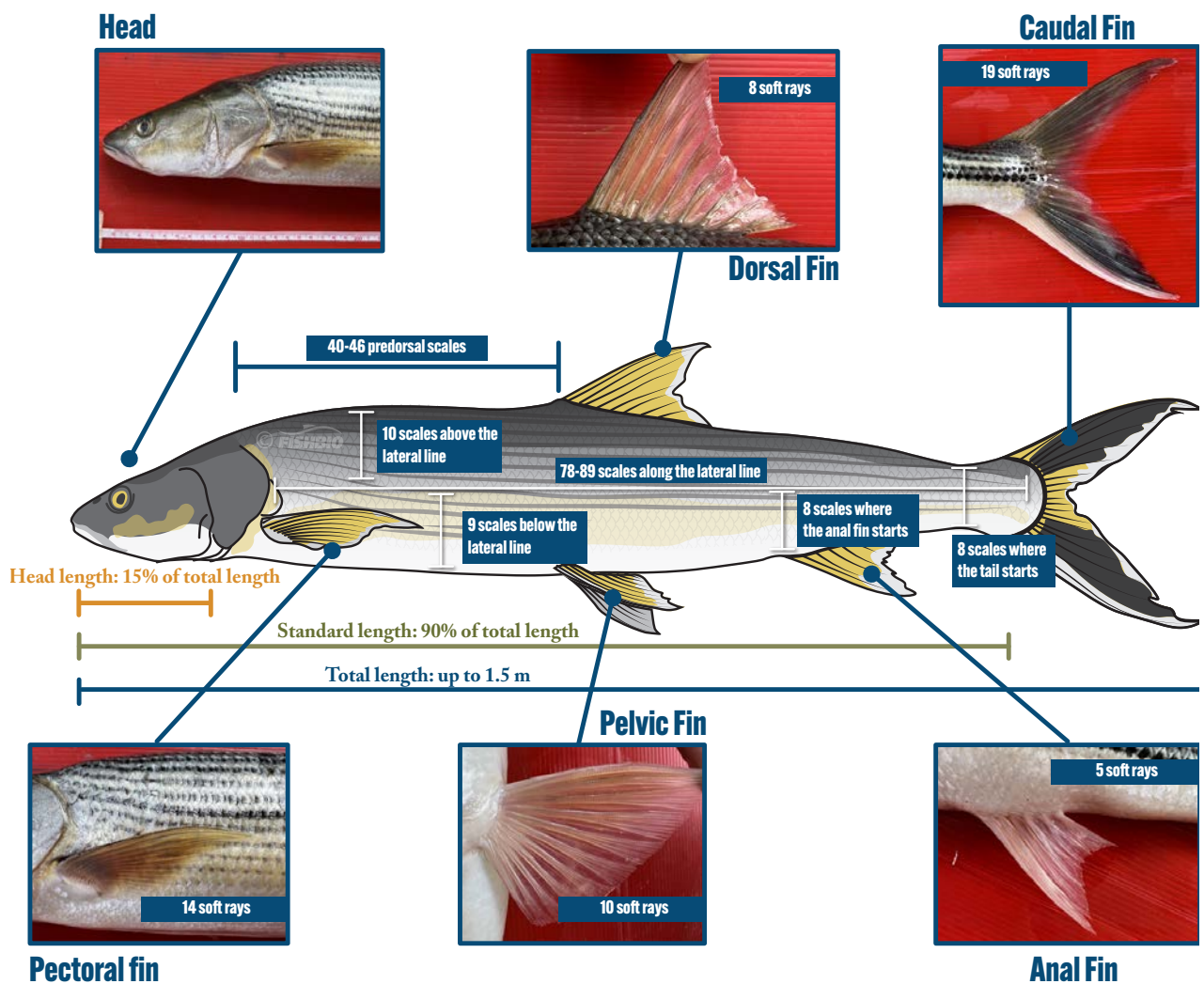


Nakai-Nam Theun National Park, where the research team caught and tagged three wolfbarb.

CURRENT RESEARCH: A two-year pilot research project titled “**Conservation Activities, Threat Analysis, and Participatory Biological Research for the Endangered and Data Poor Fish Species *Lucioperca striolatus* in Lao PDR**” supported by the International Union for Conservation of Nature (IUCN) and the Critical Ecosystem Partnership Fund (CEPF), was conducted in several rivers throughout Laos. These included the Nam Phak River in Oudomxay Province; the Nam Chat, Nam Herng, and Nam Cham rivers in Bolikhamxay Province; and the Nam Theun, Nam Noi, and Nam Xot rivers in Khammouane Province. The study collected important, fundamental data on this understudied species, which included the gathering of information on their life cycle, migration behavior, age and growth, sex discrimination, weight and length relationships, and breeding and spawning behaviors. This study has provided a critical foundation for the development of conservation and management plans for this rare species, but more scientific studies are needed to confirm details on wolfbarb life cycle and behaviors.

BIOLOGICAL DESCRIPTION

BODY: The wolfbarb’s silvery body is slender and round, like a torpedo. Fishers have reported catching individuals as large as 1.5 meters in length. Wolfbarb scales are small in size, and adults have 5-9 longitudinal black stripes above the lateral line and 4 faded black to light-yellowish stripes below the lateral line.



HEAD: The snout is long and pointed with a terminal lip. Wolfbarb have a wide jaw that extends to the lower margin of the eyes.

FIN RAYS: The dorsal fin is located in the middle of the body, and both the edge of the anal fin and the dorsal fin are concave.

TAIL: A homocercal, forked tail fin divided into two equal segments.

SCALES: 40-46 predorsal scales, 10 transverse scales above the lateral line, 78-89 lateral line scales.



STUDY LOCATION 1: OUDOMXAY PROVINCE

From 2022 to 2023, FISHBIO, the Comité de Coopération avec le Laos (CCL)¹, and government counterparts collaborated on a technical project focused on both aquatic life conservation and research actions on *L. striolatus* in the Nam Phak River basin. The project achieved several milestones including:

- Staff training on data collection methods.
- Documenting local ecological knowledge of wolfbarb
- Assessment of species distribution using Environmental DNA (eDNA).
- Habitat surveys and species surveys along the Nam Phak using hook-and-line sampling.
- IUCN Lao field mission and fisher logbook reporting on wolfbarb catch.
- A final round table discussion workshop to identify priority conservation actions.



Project staff and government partners collecting an eDNA sample from the Nam Phak.

One significant outcome was the strengthening of **five Fish Conservation Zones (FCZs)** along the lower Nam Phak for important target species such as wolfbarb and soft-shell turtles. However, investigations of wolfbarb in both the upper and lower Nam Phak using hook-and-line and eDNA surveys did not provide evidence of the species' presence in the river. The last evidence of the presence of wolfbarb in the basin were live and dead specimens spotted by the villagers and reported to the CCL in 2020 and 2021, in Huayphea village on the mainstem Nam Phak.



Signboards and watching but for the villager patrolling team, set up along one of the five FCZs established along the Nam Phak (Huaychay village, La district).



Landscape of the Nam Phak river in La district (Oudomxay Province).

The first year of project implementation in the lower Nam Phak was marked by a severe natural flood disaster in late August 2022, which caused significant damage to households, farmlands, livestock, personal assets, and basic infrastructure, as well as to the river ecosystem. This disaster posed a risk of ecological loss, and caused habitat degradation. Sediment moved by the flooding filled deep pools and caused excessive water turbidity.

However, despite these setbacks, a multi-stakeholder workshop was held at the end of the project, with the objectives of presenting project results, involving local stakeholders (communities, local authorities, civil society) in wolfbarb conservation, and drafting recommendations



Round table discussion during the multi-stakeholder workshop (in Xay, August 22, 2023).

1. CCL is a French international NGO specialized in rural development and support for remote communities in the Lao uplands. Within the framework of the IUCN/CEPF project, CCL provided funding, HR and administrative support for the setting up of the activities in Oudomxay (coordination with local government and community participation), thanks to the financial support from the French Agency for Development (AFD) and Brot für die Welt. The CCL project office is located at the PAFO office in Meung Xay, and the CCL project focuses on both La and Namor districts (Oudomxay Province), including the Nam Phak River Basin in La District.

to improve conservation in the area. The stakeholders discussed key threats to the conservation of wolfbarb and provided recommendations for addressing these impacts. Future project activities in target villages will attempt to address impacts and help increase collaboration with the villages to support species conservation and promote local awareness.



Impacts of the heavy floods from the Nam La river (tributary of the Nam Phak), in La district: destruction of paddy fields and infrastructures, erosion of the river banks and wolfbarb habitat destruction (August - September 2022).

THREATS IN OUDOMXAY PROVINCE

- ▶ Hydropower dam construction in the upper Nam Phak (upstream of La city) which could eliminate and/or degrade wolfbarb habitat.
- ▶ Sand mining, presence of beer garden restaurants, and shell and algae collection in the river bed, leading to the destruction of the spawning areas for wolfbarb and other fishes.
- ▶ River bank erosion and sedimentation that is linked to heavy floods, deforestation of the river banks and riparian forest, farming practices, and infrastructure construction.

- ▶ Water quality degradation (e.g., chemical pesticides, toxic pollution) linked to farming practices and mining activities.
- ▶ Species bottlenecks and low genetic diversity given that the population may have already been extirpated from the basin.
- ▶ Unsustainable fishing practices (use of electricity, explosives, and poisons) and overfishing that has led to an overall depletion of aquatic life, including prey species for wolfbarb.
- ▶ Climate change (e.g., flood and drought, high temperatures).
- ▶ Weak enforcement of regulations by local governance despite concerns raised by local stakeholders.

RECOMMENDATIONS

The following actions should be set up in the Nam Phak Basin to promote conservation of wolfbarb and other aquatic life:

1. Conduct a last-sighting survey, which will include comprehensive villager interviews to collect detailed data on spawning areas, spawning behavior, and hatching season.
2. If wolfbarb were recently spotted by villagers, collect eDNA samples at that site to confirm their presence. Also, the upstream Nam Phak Basin has not been fully surveyed and additional eDNA samples should be collected there.
3. Set up a survey to describe in detail the human impacts on the habitat, systematically review the potential spawning areas, and design maps and a river profile.
4. Enforce FCZ regulations and monitor effectiveness including impacts on aquatic life.
5. Draft a local strategy for wolfbarb conservation in partnership with the local authorities.
6. If wolfbarb presence is confirmed, investigate whether the Oudomxay population is genetically distinct from other populations in Laos.



Fisherman interview to describe the local knowledge and fishing practices.



Training of CCL and local government staff by FISHBIO biologist on fish monitoring and eDNA protocols (Meuang La, March 2022).

STUDY LOCATION 2: KHAMMOUANE PROVINCE

In collaboration with the Association Anoulak², local government agencies, the Nakai-Nam Theun National Park Management Division, and the Nam Theun 2 Power Company (NTPC), FISHBIO conducted research to learn more about wolfbarb in three tributary rivers of the Nam Theun watershed - the Nam Theun, Nam Noi, and Nam Xot. The following research activities were conducted in the furthest upstream locations within the national park of the Lao-Vietnam Annamite Mountains:

- Water sampling for environmental DNA in order to understand the distribution of the species in the watershed.
- Tagging of captured wolfbarb to collect data on movement, growth, and survival.
- Water quality sampling.
- Qualitative assessment of threats to the species.



THREATS IN KHAMMOUANE PROVINCE

The main threats to the population of wolfbarb in Nakai-Nam Theun National Park are:

- ▶ Wolfbarb harvest (either as a target species or by-catch) by local villagers for subsistence food and/or local trade.
- ▶ Depletion of prey for wolfbarb due to overfishing and unregulated fishing by local communities.
- ▶ Catch-and-release tourism activities that promote the species as an attraction within the national park, without prior impact assessments and management plans.
- ▶ Seasonal droughts that affect the species' habitat.
- ▶ A lack of awareness among local communities and authorities about the species' conservation value.
- ▶ Lack of a conservation plan for the species within the national park.



FISHBIO and Association Anoulak scientists collecting length and weight data and scale samples, and tagging three wolfbarb caught in Nakai-Nam Theun National Park.



Despite wolfbarb facing threats at all confirmed locations in Laos, Nakai-Nam Theun National Park in Khammouane Province is considered the most suitable location for long-term conservation of the species due to its relatively abundant population and the availability of high quality habitat.

RECOMMENDATIONS

Based on this pilot project, the final recommendations for the protection and conservation of wolfbarb in Nakai-Nam Theun National Park are as follows:

1. Conduct a follow-up study to understand the species' reproductive cycle in Nakai-Nam Theun, including the identification of key locations of reproduction and spawning.

2. The Association Anoulak is a French-registered association dedicated to the long-term conservation of biodiversity and to the resilience of local ethnic minorities in the Annamite Mountains of Laos, and in particular in Nakai-Nam Theun National Park. The association conducts biodiversity research, community sustainable livelihoods programs and capacity building and has a local office located in the Nakai district of Khammouane Province. Within the framework of the IUCN/CEPF project, Association Anoulak provided funding via grants received from Mandai Nature and Association Française des Parcs Zoologiques (AFDPZ), HR and administrative support for the setting up of the activities in Nakai-Nam Theun National Park.

2. Set up community-based Fish Conservation Zones within the national park targeted for wolfbarb.
3. If possible, avoid the practice of catch-and-release sport fishing in Nakai-Nam Theun National Park, as this park represents the best location in the world for the long-term conservation of the species.
4. If sport fishing is unavoidable, conduct an impact assessment and define appropriate regulations prior to authorizing and promoting this practice in the park.
5. Develop community-based ecotourism to observe the species in its natural habitat. Any ecotourism projects must directly benefit the local communities and ensure their involvement in the protection of the species, notably through community-based Fish Conservation Zones.
6. Conduct awareness-raising for local authorities and local communities on the conservation value of the species.



Nakai-Nam Theun National Park, the most suitable location identified by this study for the conservation of wolfbarb.

STUDY LOCATION 3: BOLIKHAMXAY PROVINCE

FISHBIO worked with the Provincial Agriculture and Forestry Office (PAFO) and District Agriculture and Forestry Office (DAFO) in Xaychamphone District to achieve several milestones, including:

- Staff training.
- Local ecological knowledge (LEK) surveys focused on wolfbarb.
- Assessment of species distribution using Environmental DNA (eDNA).
- Species and habitat surveys of wolfbarb using hook-and-line sampling.
- Specimen collection for qPCR assay development.
- An IUCN Lao field mission and collection of fisher reports on wolfbarb catch.
- A feasibility study on the tourism potential of catch and release fishing.



Wolfbarb habitat and government staff collecting eDNA in Bolikhamxay Province.

Most notably, the project held a species action plan workshop and **established three FCZs** in the Nam Chat, Nam Heng, and Nam Cham, to regulate and conserve important target species such as wolfbarb and soft-shell turtles. However, the tagging of wolfbarb was not conducted due to local complications, which provided fewer opportunities to collect data on the species in this location. Despite this missed opportunity, wolfbarb presence was confirmed in Bolikhamxay through eDNA detection, and the project made significant scientific contributions, including:

- Assessing species distribution using eDNA surveys, including the development of the first ever qPCR assay for the species.
- Establishing three community-based FCZs for wolfbarb.
- Building technical capacity for government counterparts.
- Developing a species fact sheet that summarizes the research findings, identifies gaps, and outlines future conservation actions.
- Contributions to the inclusion of wolfbarb on the Aquatic and Wildlife Protection List 1 under the Aquatic and Wildlife Law.



Wolfbarb habitat in a deep pool of the Nam Cham near Ban Sopkorn Village, this type of habitat is critical for the species and common in the studied areas of the province.

THREATS IN BOLIKHAMXAY PROVINCE

The main threats identified for the population of wolfbarb in Xaychamphone District are:

- Rapid declines in prey availability due to overfishing by local people.
- Sport fishing tours which have caused wolfbarb deaths in the project area. It is recommended that fishing tours should be reduced in number and subject to gear restrictions (e.g. barbless fishing hooks) to limit the fishing pressure on the species and avoid direct harm to the species.
- Droughts that can reduce water levels and degrade habitats, even in the FCZs.



Fish drying in a village next to one of the target sampling sites.



Nam Heng River in Bolikhamxay Province.

RECOMMENDATIONS TO ADDRESS SPECIES DATA AND CONSERVATION GAPS

It is recommended to standardize the catch-and-release protocol for fishing tours, establish clear guidelines for grassroots income benefits, implement quality control measures for fishing equipment, and include provisions for endangered species care in community FCZ management agreements.

BIOLOGICAL STUDIES

- Migration and reproductive cycles, including spawning behaviors, reproductive timing, and conditions needed for successful spawning.
- Establishment of water quality thresholds and improved understanding of habitat requirements for the species.
- Demographic information such as age structure, sex ratios, age/growth and length/weight relationships.
- Abundance estimates for each sub-basin.
- Genetic analysis of the species across its range to understand relatedness.



FISHBIO biologist collecting water quality data.



Community outreach and FCZ establishment meeting.

MITIGATION AND CONSERVATION ACTIONS

- Establishment of an FCZ network to share lessons learned and recommendations for enforcement of FCZ regulations.
- Long-term monitoring framework for wolfbarb FCZs to understand effectiveness and impacts on aquatic life.
- Development of sustainable strategies for species and habitat restoration to respond to the main threats identified for each province.
- Assessment of potential impacts of climate change on the species and its habitat.

CONCLUSION : IUCN RED LIST STATUS

At present, the **IUCN Red List has classified the wolfbarb as Endangered (EN)**. However, due to the main threats in all provinces resulting in low abundance and species occupancies in catches, **the species is at serious risk of becoming Critically Endangered (CR)**. This is further supported by the low numbers of individuals captured during targeted field surveys, and the absence of species reports in the Nam Ou Basin where it was known to occur historically. The conservation status and general trends in species abundance are concerning, and it is necessary to closely monitor the species and consider options for mitigation to maintain the species and its important role as a top predator in the river ecosystem.

Despite these ongoing concerns, this project has served to improve our scientific understanding of the species and has provided a blueprint for how conservation actions may be implemented in collaboration with local communities to improve species protections. By using the data collected and enacting the recommendations outlined by this project, we are hopeful that many of the conservation challenges can be overcome allowing this iconic species to persist for future generations.



Wolfbarb (Lucioperca striolatus).



Collecting water depth data on a bamboo raft with a local villager.



Hook and line sampling team.



Traveling to a sampling site.

ACKNOWLEDGEMENTS

This pilot research project was made possible with funding from IUCN and CEPF. This project was led by FISHBIO as well as project partners including local governments in each province, CCL, Association Anoulak, Nam Theun 2 Power Company (NTPC), and the Nakai-Nam Theun National Park Management Division. FISHBIO is a fisheries consulting company of experienced biologists specializing in fisheries research, monitoring, and conservation. FISHBIO began work in Lao PDR in 2009, and has continued to work on projects throughout Southeast Asia. Our primary goal is to draw on local and international technical expertise to build capacity for research and conservation by sharing knowledge and tools. Within this pilot project framework, FISHBIO coordinated field data collection, training of project partners, community outreach, and FCZ establishment.

REFERENCES

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