Studying Mekong Fish Migrations with Acoustic Telemetry

Developing a receiver network and community partnerships to track movements of ecologically and economically important fish species in the Mekong Basin

Project Lead
FISHBIO

Project Timeline
2021-2024

Funding
USAID Wonders of the Mekong

Collaborators
Cambodian Fisheries Administration (FiA), Inland Fisheries Research and Development Institute (IFReDI), Joint Ecological Monitoring Program of the Mekong River Commission (JEM), Royal University of Agriculture (RUA), Young Eco Ambassadors (YEA)

Fish are surgically implanted with acoustic tags, which are detected by acoustic receivers.

Project Background

Many Mekong fish species undertake short or long-distance migrations as part of their life cycles to access important habitats such as floodplains, deep pools, and flooded forests. Understanding when and where fish migrate is important to ensure that key habitats remain connected so that fish can complete their life cycles to support healthy fisheries. However, there is a lack of empirical data on the specific timing and patterns of fish movement in the Mekong Basin. Acoustic telemetry is a powerful tool for addressing these knowledge gaps. This technology relies on sound-emitting tags that are surgically implanted in fish. These fish are then released into the river, and their tags are detected by acoustic receivers (underwater microphones) placed strategically throughout the river. Receivers record information on tagged fish that swim by, including a unique fish identification number, and the time of detection. This detection data can help scientists visualize movements of individual fish over multiple seasons and years. With funding from USAID through the Wonders of the Mekong project, FISHBIO, and project partners are working to deploy an acoustic telemetry receiver network throughout the mainstem Mekong and key tributaries in Cambodia.

Objectives

This collaborative project seeks to establish the first ever acoustic receiver network in the Cambodian Mekong to track the movements of migratory fish in the mainstem Mekong River, from the Lao PDR border to Kampong Cham, as well as in the Sekong, Sesan, and Srepok (3S) Basin of northeastern Cambodia. In addition, coordination and data sharing with a concurrent telemetry study being conducted by the MRC's JEM Program in southern Lao PDR will allow for analysis of fish movement across an international boundary.

Key Points

- Acoustic telemetry is **being used for the first time** in the Cambodian Mekong to study fish migrations
- A **network of receivers** will track fish in the mainstem Mekong from the Lao border south to Kampong Cham, as well as in the Sekong, Sesan, and Srepok (3S) rivers
- A collaboration with an MRC project in Lao PDR that is also tagging and releasing fish will allow for analysis of **cross-border fish migrations**
- Data from this project will provide important insight into **when and where fish are moving** at local and international scales.

Methodology

Acoustic receivers are being strategically deployed at 11 sites throughout the basin with potential for expansion in the future. With support from local communities and project partners, FISHBIO staff are deploying custom-designed floating platforms at each monitoring location with attached acoustic receivers to continuously monitor for tagged fish in the river. Fish species of interest will be tagged by FISHBIO personnel with support of project partners at multiple locations. Several target species have been selected, although other species of ecological interest and/or economic importance may be opportunistically tagged as well. The specific numbers of individuals and species will depend upon availability of fish in good condition. Additional tagging by the JEM team will take place in southern Lao PDR, and all detection data will be shared between the two programs.

YEA, FISHBIO staff, and IFReDI staff have coordinated with local Fisheries Administration officials to hold meetings with the communities near each monitoring station. These meetings served to inform local fishers and villagers about the project, to explain the value of the fish movement data being collected by this effort, and to seek their support in providing fish for tagging, reporting captured tagged fish, and monitoring receiver stations throughout the wet season.

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Table 1. Site locations and numbers of receivers deployed.

Location	# of Receivers	Latitude	Longitude
Kampong Cham	2	11˚59’54.52” N	105˚28’29.89” E
Kracheh	2	12˚27’1.62” N	106˚1’2.87” E
Koh Preah	4	13˚17’52.52” N	105˚55’24.38” E
Stung Treng	4	13˚32’9.06” N	105˚56’23.15” E
Koh Snam Chey	5	13˚34’48.24” N	105˚59’27.59” E
Koh Hib	3	13˚42’36.56” N	106˚0’36.90” E
Lao Border	6	13˚55’42.21” N	105˚57’4.09” E
Sekong–Mekong Confluence	2	13˚32’11.59” N	105˚58’18.40” E
Sekong	2	13˚33’45.30” N	106˚2’57.08” E
Sesan	2	13˚33’44.48” N	106˚8’13.58” E
Siem Pang	2	14˚07’30.9” N	106˚23’40.9” E

Building An Acoustic Network

The receiver network has been designed to provide detection coverage of key locations, and receiver sites were selected to maximize the likelihood of tag detection across the entire width of the river (Table 1). In most locations, receivers are mounted on custom-built floating platforms, but several are being mounted on docks and floating houses in areas where such infrastructure exists. A network of community members from the villages near each of the sites is assisting with monitoring of the receiver locations to ensure the systems remain in place throughout the wet season.

Fish Tagging and Release

Fish tagging efforts are taking place in Cambodia in 2022. FISHBIO staff will surgically tag and release fish at multiple lcoations throughout the watershed at the beginning of the dry season. Surgery stations will be established with the support of trained IFReDI staff and RUA students. Potential locations include the village of Preah Rumkel near Don Sehong Dam on the Lao border, Stung Treng town, the lower Sesan River, the village of Koh Preah, and in Kracheh town. This effort will focus on tagging and releasing over 150 fish.

YEA will coordinate with Fisheries Administration officials and local fishers to obtain fish for tagging. Target species have been identified (Table 2), but the precise number of each for tagging will depend upon the availability of appropriately sized individuals in good condition. Additional species of interest (e.g., other highly migratory, commercially important, or imperiled species) may be tagged opportunistically if available. For example, a Giant Freshwater Stingray (*Urogymnus polylepis*) was opportunistically tagged at Koh Preah during receiver deployment field work in June 2022.

Coordination with the JEM team in Lao PDR will ensure that tag detection data from both sides of the international boundary will be shared for analysis.

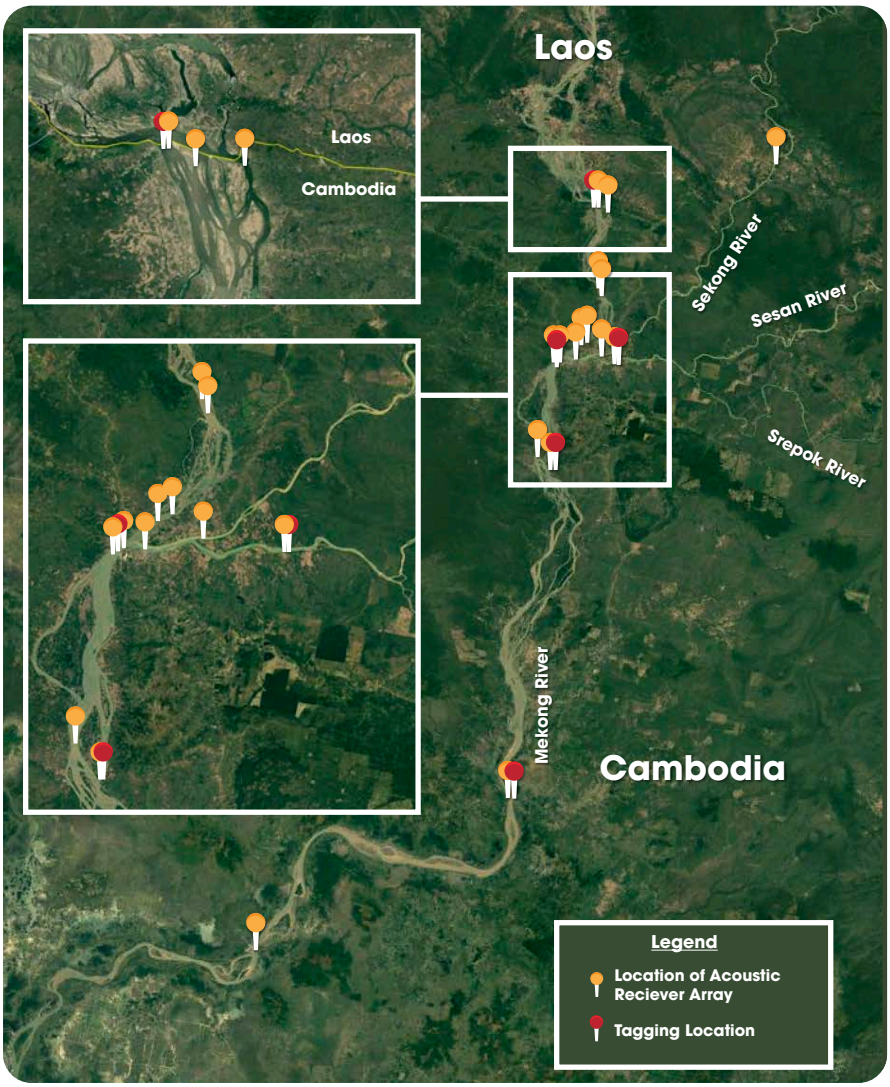

Table 2. Target species for tagging selected based on availability and hardiness. Additional species may be tagged opportunistically.

Order	Genus and species
Siluriformes	*Pangasius hypothalmus*
	Pangasius krempfi
	Pangasius laurnadii
	Bagarius yarrelli
Cyprinidae	*Labeo chrysophekadion*
	Mekongina erythrospila
	Cirrhinus microlepis