AGREEMENT ON THE INTERNATIONAL DOLPHIN CONSERVATION PROGRAM

52ND MEETING OF THE PARTIES

La Jolla, California (USA)
23 - 24 October 2025

DOCUMENT AIDCP-52 INF-A

RESEARCH PROPOSAL – PHASE II OF CKMR ON DOLPHINS IN THE EASTERN PACIFIC OCEAN

Field test skin swabbing, genetic panel development, roadmap for epigenetics work, and conceptual population models - Phase II of CKMR on dolphins in the eastern tropical Pacific Ocean	
Links to IATTC Strategic Science Plan (to be prepared by the staff)	
Objectives	**PHASE I (ongoing, with estimated completion in January 2026)** Team University of Alaska Southeast- Associação para a Investigação do Meio Marinho (UAS-AIMM): 1. Determine number of skin-swab samples from live dolphins that are possible to collect from each set to calibrate time-scale of obtaining sample size goals. Team Nova Southeastern University (NSU): 2. Examine quality, quantity, and contamination levels of DNA taken using three different sampling methods. 3. Assess the potential to epigenetically age animals from different tissue samples. **PHASE II** (once Phase I completes, if successful) Team UAS-AIMM 4. Field test skin swabbing. 5. Collect 50-100 samples (biopsies, skin swabs and teeth) from mortalities across the population's range for both ETP spotted dolphins (*Stenella attenuata*) and spinner dolphins (*Stenella longirostris*). Team NSU: 6. Optimize laboratory protocols for efficient downstream labwork. 7. Develop a high-throughput genetic panel for both species. 8. Test the genetic panels on skin swabs. 9. Develop roadmap for epigenetics work (collaboration with team IATTC). Team IATTC and external collaborators: 10. Development of conceptual model for ETP dolphin population /fisheries.

Background	Close-kin mark-recapture (CKMR) is a promising method for improving assessments of multiple species of dolphin in the ETP. Being reliant on genetics-based kinship assignment to estimate population parameters, a full-scale CKMR project requires a large number of tissue samples containing high quality and uncontaminated DNA. Constraints related to feasibility and human/animal welfare may impede collection of high quality tissue samples, which would preclude the application of CKMR; alternatively, if these constraints can be overcome, then it may be possible to collect vital information related to stock structure, kinship, and even age from a single tissue sample, which would help facilitate the use of CKMR to monitor dolphin populations in the ETP. Phase I of this project will inform sampling design for CKMR by assessing the number of tissue samples that can be collected from live dolphins from each purse seine set, as well as the utility of DNA collected from tissue samples that meet the necessary criteria for feasibility and welfare. In addition, the potential to apply epigenetic aging to dolphin tissue will be assessed, using DNA quantity as a proxy for potential success. The outcome of Phase I will help us assess the feasibility of sample collection for CKMR and, if sampling is deemed feasible, optimize sampling protocols prior to application of this promising method. **Phase I is well underway, with its fieldwork phase completed. The laboratory phase of Phase I is currently in progress, and its completion is anticipated in January 2026**. If Phase I is successful, then Phase II of the project will lay the groundwork for scaling up sampling and genotyping efforts. A team of three researchers will join purse seine fishermen and groundtruth the estimates of feasible sample collection from Phase I while honing the skin swab sampling protocol. Simultaneously, biopsy samples, teeth, and a small number of additional skin swabs will be collected from mortalities on purse-seine sets across the population's range for both spotted dolphins (*Stenella attenuata*) and spinner dolphins (*Stenella longirostris*) in the ETP. The biopsy samples will be used to develop a high-throughput genetic panel that targets DNA regions that are informative for kinship and stock structure, while the skin swabs will be used to optimize DNA extraction protocols. The teeth can be used to assign ages to the animals, which will facilitate epigenetic clock development during the next phase of the project depending on the epigenetic roadmap that will be established during Phase II. Finally, the genetic panel will be tested using skin swabs collected during field-testing of the skin swab sampling protocol. Altogether, we expect that following Phase II, the resources and protocols will be in place for large-scale application of CKMR. It is crucial that sampling is minimally disruptive to fishing operations and safe for the researchers and dolphins, so we have included multiple steps for testing and refining the sampling protocol. More generally, <u>we have several checkpoints in place for this project to ensure that funds are used judiciously and effort is not wasted. As such, Phase II will not commence unless/until Phase I is deemed successful.</u>
Relevance for management	CKMR has the potential to provide estimates of key management quantities that have been challenging to obtain for dolphin populations using alternative methods, including estimates of absolute adult abundance, natural mortality rates, population trend (potentially), and other quantities. If CKMR is deemed feasible for dolphins in the EPO, then the method can provide a baseline estimate of population abundance and a relatively low-cost way to track population trends into the future.

Pros	- CKMR has the potential to estimate key population parameters that are vital for population assessments. - Following initial investments in project setup (this proposal) and a baseline abundance estimate, the costs and efforts required for continued population monitoring with CKMR are quite reasonable. - The proposed project includes multiple phases and checkpoints to ensure judicious application of funds, time, and effort.
Cons	- Though the sample collection methods proposed are minimally invasive to the animal, some contact with individual dolphins is required to collect samples for CKMR, which may disturb the animals and pose safety risks for humans (though the proposed methods go to great length to minimize both). - Sample collection may delay fishing operations. However, we have included multiple stages of sample collection and protocol honing to calibrate methods and sample size expectations to keep disruptions as minimal as possible.
Duration	Phase I: 1 year (ongoing, estimated completion in January 2026) Phase II: 1.5-2 years (estimated 0.5-1 year to collect samples given observed mortality levels; 1 year expected for genetic panel development and testing after samples are received).
Workplan **(project staging)**	**Phase I (pending tasks)** <u>Team UAS-AIMM:</u> - **Oct-Dec 2025**: Review existing drone footage to assess the likely number of dolphin skin swab samples that can be realistically collected during a purse seine set. <u>Team NSU:</u> - **Oct 2025 – Jan 2026**: Examine DNA quality, quantity, and contamination levels from skin swabs and biopsies, all collected from natural mortalities (n=3-10, depending on what is feasible). - **Oct 2025 – Jan 2026**: Examine the potential to age animals epigenetically using skin swabs. For this goal, DNA quantity will be used as a proxy for whether epigenetic aging from skin swabs is technically feasible (>= 10ng total DNA would indicate technical feasibility). **Phase II (<u>to be initiated if Phase I is deemed successful</u>)** <u>Team UAS-AIMM:</u> - **Jan-Mar 2026: IACUC protocol development and approval**. Request and obtain permits for field test and skin swab sampling (Animal Ethics, IACUC (Institutional Animal Care and Use Committee) at UAS; any permits required by CPCs for work with live dolphins). - **Jan-Feb 2026: Coordinate sampling of 50-100 mortalities by observers/fishing crews**: 1) Observer/crew trainings, 2) supply ordering, 3) kit assembly and shipping to IATTC regional offices, 4) data analysis, 5) report writing, presentations, and meetings. - **April or late Jule-July 2026** (depending on whether arrangements can be made for team to disembark by late April, allowing time to prepare for the

	presentation of the cow-calf study at the IATTC SAC-17 in June 2026): **Field test and refine the skin swab sampling protocol.** The UAS-AIMM team can complete the skin-swabbing work aboard a vessel in 10-14 days. To expedite the project, it is requested that arrangements be made for the team to disembark the vessel after 10-14 days rather than remaining aboard for an entire fishing trip. Tasks include: 1) field preparation logistics, 2) fieldwork (including collection of video materials for crew training), 3) data analysis, 4) report writing, presentations, and meetings. <u>Observers and fishing crews:</u> - **Jan-Dec 2026: Collect biopsy, swabs, teeth samples from 50-100 mortalities (per species) across the population's range.** Permits from Mexico are already in place and opportunistic sampling continues to take place aboard Mexican purse seiners using leftover sampling kits from Phase I; permits from authorities in other CPCs will be sought between Oct-Dec 2025 (e.g. Ecuador, Colombia and Panama). <u>Team NSU:</u> - **Jan-Jun 2026: Develop roadmap for epigenetics work** (in coordination with IATTC staff). - **Jan-Dec 2026: Optimize DNA extraction and laboratory protocols** to secure high quality species-specific DNA. - **Jan-June 2027: Develop a high-throughput genetic panel** that is informative for kinship and stock structure. This work will be outsourced to a commercial genotyping company. - **July-Dec 2027:** Apply the genetic panel to the skin swab samples collected during field testing and hone the panel as needed. This work will be outsourced to a commercial genotyping company. <u>IATTC staff and collaborators:</u> - **Nov 2025 – Mar 2026:** Development of conceptual model for ETP dolphin population /fisheries
External collaborators	Fishing industry partners (e.g. PAST, Atun Sostenible, others)
Deliverables	SAC reports etc…
Budget (US$)	

UAS/AIMM

Budget Category	UAS (USD)	AIMM (Euros)	AIMM (USD)*	AIMMround	CategoryTotals
Salary + benefits (1 researcher UAS; 2 researchers AIMM)	85,000	134,700	157,664	158,000	243,000
Travel	5,000	33,820	39,586	40,000	45,000
Equipment and Supplies	30,000	11,800	13,812	14,000	44,000
Contractual (insurance, video production, publication fees)	-	13,000	15,216	16,000	16,000
Sum	120,000	193,320	226,277	228,000	348,000
Overhead (20% UAS, 10% AIMM)	24,000	19,332	22,628	22,800	46,800
Total	144,000	212,652	248,905	250,800	394,800

Total UAS/AIMM (USD) 394,800

NSU

Budget Category	NSU(USD)	NSUround
Labwork/protocol optimization	10,000	10,000
Personnel (1 researcher)	118,205	119,000
University overhead (20%)	25,641	26,000
Development and testing of kinship panel (genotyping company	108,000	108,000
Total	261,846	263,000

Total NSU (USD) 263,000

IATTC secretariat

2-year contract project manager	108,000
Observer bonus (200 USD/trip, 200 trips)	40,000
Sample shipping costs	5,000

Total IATTC secretariat (USD) 153,000

GRAND TOTAL **810,800**