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EDGE

EVOLUTIONARILLY DISTINCT & GLOBALLY ENDANGERED

Survival Blueprint

Pelagic Thresher Shark
Alopias pelagicus

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1. STATUS REVIEW

1.1 Taxonomy:

Kingdom: Animalia
Phylum: Chordata
Class: Chondrichthyes
Order: Lamniformes
Family: Alopiidae
Genus: Alopias
Species: *Alopias pelagicus*
Common name: Pelagic thresher shark
Local Name if any: Hiu Tikus, Hiu Monyet, Cucut Tikus (Indonesia) Yee Pesawat, Yee Tikoh (Aceh)

The genus and family name of the species have its origins in the Greek word *alopex* meaning fox. Therefore, the long-tailed sharks from the family Alopiidae are also known as fox sharks. All of the three thresher shark species, Common thresher shark (*Alopias vulpinus)*, Big-eye thresher shark (*Alopias superciliosus)* and pelagic thresher shark (*Alopias pelagicus)*, refer to a group of pelagic sharks distinguished by the elongated dorsal lobe of their caudal fin, which is almost as long as their body length (Gruber & Compagno, 1981).

1.2 Distribution and population status:

1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
Global	No data	Pacific Ocean	Decreasing (Rice et al., 2015)	Catch from the Pacific was represented by Alopias species-complex (due to scarcity of species-specific data) standardized CPUE for 19 years between 1996–2014 by Western Central Pacific Fisheries Commission (WCPFC) The CPUE indicated a decline, particularly from 2010 to 2014 (Rice et al. 2015).

Global	No data	Indian Ocean	Decreasing (E. Romanov unpublished data in Rigby et al., 2019)	Nominal CPUE for pelagic thresher (*Alopias pelagicus*) for 21 years between 1967–1987 suggested an annual rate of decline of approximately 1% per year (Romanov et al. 2006, E. Romanov unpublished data).

1.2.2 Local distribution in Indonesia:

Region / province	Site	Level of Protection	Population size	Reference(s)	Notes
All	All	export regulated by the Indian Ocean Tuna Commission (IOTC) Resolution and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Alopias species complex catch average 12,891 tonnes per year (2005-2011)	(Dharmadi et al., 2013, 2017)	National
Aceh	PPS Kutaradja, Lampulo, Banda Aceh	IOTC Resolution and CITES export regulated	237 individuals of *Alopias pelagicus* or 35.7% of total shark and rays landed in PPS Kutaradja in 2020	(Ichsan et al., 2020; Benaya M Simeon et al., 2020)	Fisheries Landing site
	SW Aceh	IOTC Resolution and CITES export regulated	70 individuals of *Alopias pelagicus* or 6.2% of total shark landed in SW Aceh in 2020.	(Ichsan et al., 2020; Benaya M Simeon et al., 2020)	Fisheries Landing site

Bali	Benoa	IOTC Resolution and CITES export regulated	11 individuals of *Alopias spp.* or 262 kg between 2013-2016	(Jatmiko & Rochman, 2018)	Fisheries Landing site
Bali	Penida	IOTC Resolution and CITES export regulated	1 Baited Remote Underwater Video (BRUV) survey sightings between March and April 2016	(Prasetyo et. al., 2019)	Recreational dive site
NTT	Alor	IOTC Resolution and CITES export regulated	50 Individuals of Alopias spp. between July 2018 – May 2019	(Rafid Shidqi et al., 2019)	Fisheries Community Landing site and Recreational dive site
NTB	Tanjung Luar	IOTC Resolution and CITES export regulated	94 individuals of *Alopias pelagicus* or 1.35% total shark landed in Tanjung Luar in 2020.	(B M Simeon et al., 2019)	Fisheries Community Landing site
East Kalimantan	Maratua	IOTC Resolution and CITES export regulated	0.07 Underwater Visual Census (UVC) Sightings per dive of Alopias spp. Between March 2019 – Feb 2020	(Dinas Kelautan dan Perikanan Kalimantan Timur, 2018)	Recreational dive site

1.3 Protection status:

The pelagic thresher shark is listed in a number of global and national (Indonesia) protection frameworks, namely the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Indian Ocean Tuna Commission (IOTC).

A. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) listed pelagic thresher shark in Appendix II which in Convention text Article IV point 2 states that: "The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met:

   (a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species;
   (b) a Management Authority of the State of export is satisfied that the specimen was not obtained in contravention of the laws of that State for the protection of fauna and flora; and
   (c) a Management Authority of the State of export is satisfied that any living specimen will be so prepared and shipped as to minimize the risk of injury, damage to health or cruel treatment".

B. Indian Ocean Tuna Commission (IOTC): Resolution 10/12 on The Conservation of Thresher Sharks (Family Alopiidae) Caught in Association with Fisheries in The IOTC Agreement Area.

These regulations were ratified by Indonesian regulations as described below:

A. IOTC Resolution 10/12 ratified in Ministerial Decree No. 30 /2012 jo 26/2013 regarding Capture Fishery Business in the State Fishery Management Area of The Republic of Indonesia, Art 73 which stated that:

   (1) "Every fishing vessel that has permit (SIPI) in Indonesian Fisheries Management Area (WPP-NRI) is obliged to take conservation measures towards certain species that are ecologically related to tuna, which is stipulated by the Regional Fisheries Management Organization (RFMO).
   (2) Certain species as intended in paragraph (1) are in the form of: (a). bycatch fish such as thresher sharks, sea turtles, and marine mammals including whales; or (b). non-fish caught incidentally (incidental catch) in the form of seabirds.
   (3) Conservation measures for bycatch fish as referred to in paragraph (2) letter (a) include: (a). releasing the caught fish if still alive; (b). handling and/or gutting the caught fish in a dead state and landed it intact; (c). record the types of fish caught dead, and report them to the Director General through the head base port as stated in the fishing permit (SIPI).

(4) Conservation measures for non-fish caught by accident (incidental catch) as referred to in paragraph (2) letter (b) include: (a) releasing captured non-fish species if they are still alive; (b) conduct recording of non-fish species caught which are dead, and report it to the Director General via head of the base port as stated in fishing permit".

B. Prohibition from issuing export recommendations based on the Letter of the Director of Marine Conservation and Biodiversity (KKHL) No. 2078 / PRL.5 / X / 2017.

1.4 Ecology, behaviour and habitat requirements:

The pelagic thresher shark (*Alopias pelagicus*) is epipelagic and can be found within the tropical and subtropical Indo-Pacific. Its vertical distribution varies from 0 to 300 meters depth (Weigmann, 2016), with an average of 0-150 meters (Ebert et al., 2013; Last et al., 2009). This shark is primarily an oceanic species, however, it is also known to get caught close to the shore. Divers have reported seeing individuals near coral reefs, drop-offs, in vast lagoons, and on sea mounts. The pelagic thresher shark is viviparous with oophagy and uterine cannibalism, as in other thresher shark species. Females give birth year-round with no definitive birth season and the gestation period is unknown (Liu et al., 1999).

In Taiwan and Indonesia, female age-at-maturity ranges from 9 to 13.2 years and maximum age ranges between 24 and 28 years (Chen & Yuan, 2006; Drew & White, 2015; Liu et al., 1999). Generation length has been estimated at 16.5 years in Taiwan and 20.6 years in Indonesia. Averaging these results in a generation period of 18.5 years. Assuming two pups are born each year, a female may have a total offspring of 40 during her lifespan.

Based on the survey at fish landing centers in Southern Indonesia (Bali, Lombok and Cilacap) between 2001-2007 covering both industrial and artisanal fisheries, the estimated total length of pelagic threshers ranged between 130 cm and 320 cm total length (TL). Surveys carried out in 2012 in Lombok, recorded the length of landed pelagic thresher shark as between 130 cm and 280 cm TL with an average around 230 cm TL (Dharmadi et al., 2013; Fahmi & Dharmadi, 2015). Most recently, a survey conducted between 2017-2020 in Aceh shows that most of the individuals caught were mature and 73% of the catch composed by pelagic thresher sharks is bycatch from handlines that operated by vessel crew while waiting in between purse seine soaking time within the purse seine fleet. (Benaya M Simeon et al., 2020). The maximum length of the Pelagic thresher shark is recorded at 365 cm TL, with females maturing at around 260 cm TL and males maturing around 240 cm TL, indicating that the pelagic thresher sharks caught in Indonesia (Indian Ocean) are both juveniles and adults and the size varies depending on the fishing gear (White et al., 2006).

Predation strategies by sharks are varied among species and also among individuals (Bres, 1993; Heithaus et al., 2008; Motta & Wilga, 2001). Thresher sharks use their

tail as a whip to stun and immobilize their prey; a behavior that is unique to the genus despite differences in morphology and ecology among the three species (Allen, 1923; Gubanov, 1972; Preti & Smith, 2001; Stillwell & Casey, 1976). A study in California and The Philippines showed that thresher sharks employ their tail to stun and immobilize schooling fish (Aalbers et al., 2010; Oliver et al., 2013).

1.5 Threat analysis:

Threat	**Description of how this threat impacts the species**	**Intensity of threat** *(low, medium, high, critical or unknown)*	**IUCN Red List threat category**
Fisheries (Global)	The pelagic thresher shark is caught both as target and bycatch in commercial and small-scale pelagic longline, purse seine, and gillnet fisheries. Most of the catch is recorded as bycatch of industrial pelagic fleets in offshore and high-seas waters (Camhi et al., 2008). It is also captured in coastal longlines, gillnets, trammel nets and trawls (Camhi et al., 2008; Martínez-Ortiz et al., 2015; Temple et al., 2019). The species is generally retained for its meat and fins in many countries of Asia (Dent & Clarke, 2015)	High	5.4.1(artisanal shark targeted long-liners); 5.4.3 (artisanal long-liners); 5.4.4 (commercial long-line and purse seine fisheries)
Industrial Fisheries (Indonesia)	The pelagic thresher shark is generally bycatch in commercial pelagic fisheries such as the tuna commercial fisheries. In Indonesia, there has been a drastic decline in production between 2002-2011 which might be caused by a reduction in the number of fishing boats or decline in population (Fahmi & Dharmadi, 2013).	High	5.4.4 (commercial long-line and purse seine fisheries)
Artisanal Fisheries (Indonesia)	Most artisanal fisheries in Indonesia are multi-gear and multi-species fisheries. However, around 90% of the Indonesia fleet is categorized as small-scale of less than 30 Gross Tonnage (GT) that also catch sharks including pelagic thresher shark. In some locations in Indonesia, fishers are specialized in fishing shark with highly selective gear and fishing operations which if not managed properly, can contribute to population decline in slow-growing species such pelagic thresher shark.	High	5.4.1 (artisanal shark targeted long-liners); 5.4.3 (artisanal long-liners)

Climate Change (Global)	The response of sharks to climate change is difficult to predict, and the effects of climate change are overshadowed by other threats such as overfishing. However, climate change is expected to have significant impacts on marine ecosystems, with changes in ocean temperature increasing the risk of extinction for many species as well as affecting the global distribution of marine organisms (Birkmanis et al., 2020)	Unknown	11.1; 11.3 (habitat shifting and alteration due to oceanic temperature changes)
Microplastics (Global)	Accumulation of microplastic on marine top predator body tissue.	Unknown	9.4. (Plastic)

1.6 Stakeholder analysis:

Country	**Stakeholder**	**Stakeholder's interest in the species' conservation**	**Current activities**	**Impact** *(positive, negative or both)*	**Intensity of impact** *(low, medium, high or critical)*
International	CITES	Monitor trade of CITES Listed species.	Listing and setting rules for international trade	Positive (Regulating trade and utilization to ensure sustainability)	Medium
Indonesia	Government of Indonesia (GoI)	Ratification of CITES in President Decree No. 43/1973 and Traceability of CITES Species Trade in Ministerial Regulation No. 61/2018	Listing and setting rules for international trade	Positive (Regulating trade and utilization to ensure sustainability)	Medium
International	IOTC	Sustainable tuna fishing with bycatch reduction	Setting rules for Tuna Related fisheries including shark as an	Positive (Regulating catch and utilization in fisheries activity under IOTC member party)	Medium

			incidental catch		
International	International NGO - Wildlife Conservation Society (WCS)	Support multiple governments and partners in thresher shark conservation.	Providing scientific analysis, support and literacy for thresher shark, supporting regulation with scientific information. Support alternative livelihood development and outreach activities.	Positive (Providing information and support for improve management)	Medium
International	International NGO – Global Fishing Watch	Support multiple governments and partners in thresher shark conservation.	Providing scientific analysis and support in Vessel monitoring system	Positive (Providing information and support for improve management)	Medium
International	International NGO – Zoological Society of London	Support government and partners in thresher shark conservation.	Providing scientific analysis, support and literacy for thresher shark, supporting regulation with scientific information. Support alternative livelihood development and outreach activities.	Positive (Providing information and support for improve management)	Medium
Indonesia	Ministry of Marine Affairs and Fisheries – Directorate of Conservation	Improving the status of thresher and other shark species by regulating	Implement CITES and IOTC resolutions, monitor and regulate	Positive (Regulate and Implement Conservation)	High

		fisheries and trade activities.	fisheries and trade of shark species.		
Indonesia	Ministry of Marine Affairs and Fisheries – Fisheries Research Center.	Provide scientific information for thresher shark	Providing scientific analysis, support and literacy for thresher shark, supporting regulation with scientific information. Research for shark biology, ecology, and social-economic assessment.	Positive (Providing information and recommendation for improve management)	High
Indonesia	Ministry of Marine Affairs and Fisheries – Regional Management Unit (UPT PRL).	Management authority of CITES for fish species in Indonesia	Conservation action, Outreach, trade monitoring, conservation implementation	Positive (Regulate and Implement Conservation)	High
Indonesia	Indonesia Institute of Science	Provide scientific information for thresher shark	Providing scientific analysis, support and literacy for thresher shark, supporting regulation with scientific information. Research for shark biology, ecology, and social-economic.	Positive (Providing information and recommendation for improve management)	High
Indonesia	Provincial Fisheries Agencies	Manage local species fisheries	Implement monitoring and regulate	Positive (Regulate and Implement	High

			fisheries and trade of shark species in local level. Developing localized plan of action	Conservation in local level)	
Indonesia	Exporters	Supply shark products to international markets.	Exporting shark product. currently no quota for thresher shark, but still to be monitor in compliance.	Positive (to support conservation and coastal community livelihood) Negative (If trade not regulated and monitored)	High
Indonesia	Local Traders, processor and Boat owners	Supply shark products to national and local markets.	Trading, support in fishing operation and processing shark product within the country.	Positive (to support conservation and coastal community livelihood) Negative (If trade not regulated and monitored)	High
Indonesia	Shark Fishers	Sustainable income and livelihood. Alleviation of poverty	Fishing shark	Positive (to support conservation and coastal community livelihood) Negative (If fisheries not regulated and monitored)	High
Indonesia	Fishers	Sustainable income and livelihood. Alleviation of poverty. Targeted species are a source of income that might be affected by regulation.	Fishing with a chance of shark as secondary catch	Positive (to support conservation and coastal community livelihood) Negative (If fisheries not regulated and monitored) Negative (Reduce catch and income)	High
Indonesia	Universities (e.g.	Support government	Providing scientific	Positive (Providing information and	High

	Universitas Syiah Kuala (UNSYIAH), Universitas Teuku Umar (UTU), Universitas Abulyatama, Institut Pertanian Bogor (IPB)	and partners in thresher shark conservation.	analysis, support and literacy for thresher shark, supporting regulation with scientific information. Research for shark biology, ecology, and social-economic. Support alternative livelihood development and outreach activities.	recommendation for improve management)	
Indonesia	Local NGOs – KuALA Network	Support government and partners in thresher shark conservation.	Support advocacy for marine conservation.	Positive (Providing support for advocacy to improve management in local level)	Medium
Indonesia	Maritime Customary Institution – Panglima Laot	Customary institution that regulates and implements maritime law in Aceh	Regulate and implement maritime law in Aceh and Support advocacy for marine conservation in National Level	Positive (As an institution that represent fisheries and marine conservation leadership)	High

1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
Socio-cultural effects and cultural attitudes	In some places in Indonesia, thresher sharks are thought of as any other fish resource. In particular the meat is served in traditional dishes like satay, meatball and curry.	- Regulating shark fisheries is not only limited to trade but it also needs to consider food security. Some coastal communities consume shark as part of their protein source and this has been occurring for generations.	Threshers are used in Acehnese traditional dishes, the interest of people for maintaining sustainably fished stocks might increase the success of campaigns to raise awareness on shark bycatch and/or interventions aimed at managing large-scale fisheries or finning.
Economic implications	Thresher shark is a high value commodity, where almost every body-part can be utilized. Since thresher sharks are also associated with other high-value fish (e.g. tuna), the economic opportunity costs of avoiding thresher shark bycatch can be high.	- In commercial fisheries (e.g. tuna fisheries) where thresher sharks are taken as bycatch – threshers can be difficult to avoid entirely, with high economic opportunity costs in terms of lost capture of target species, and post-capture release is only moderately effective. - In value, although not as high as requiem shark, they are still relatively valuable compared to other marine resources of commercial interest.	- Threshers are a high value commodity, the interest of people for maintaining sustainably fished stocks might increase the success of campaigns to raise awareness on shark bycatch and/or interventions aimed at managing large-scale fisheries or finning.

Existing conservation measures	- CITES Regulation: following CITES regulation appendix II, Thresher shark export trade should be strictly regulated; however Indonesia hasn't implemented CITES mechanisms for this species. - IOTC resolution is not optimally implemented and only covers industrial fleets in Indonesia.	- For shark species in general, international trade mostly focuses on fins and thresher shark fins are relatively easy to identify. However, monitoring and compliance challenges remain, and export bans don't necessarily stop the fishing. - IOTC resolution has not been implemented well since Indonesia mostly consists of small-scale fisheries that are not a subject of IOTC (they do not require fishing permits) and include multi-gear and multi species fisheries that are really difficult to monitor considering the country's vast geography and limited human resources with respect to vessel observers.	- Opportunity to strengthen commitment for thresher shark conservation based on IOTC resolution that was ratified in Ministerial Decree No. 30 /2012 jo 26/2013, especially in the monitoring and live-release on board and monitoring at landing sites - Opportunity to develop regulation on monitoring and compliance for small-scale fishing vessels.

Administrative/political set-up	Indonesia is a huge island nation with lots of provinces and different levels of governance.	- Political complexity of managing international/cross-border stocks (Thresher populations straddle many countries, requires co-ordinated management between countries) - Can be difficult to coordinate and monitor among levels of governments, difficult to ensure national regulations are implemented at the local level especially in remote places. - Fisheries management involve many related government bodies that require stronger coordination.	Opportunity to develop more integrated action plans to synchronize implementation. For example, it would be beneficial to develop a focused management task force for certain shark species or establish networks/alliance with other important stakeholders that have interests in shark species conservation.

Local expertise and interest.	- Need more expertise in shark conservation at the local level - Need more expertise in fisheries engineering to increase selectivity - Need more expertise in trade management - Need good will from private sector on increasing compliance to IOTC resolutions (e.g. more onboard observer in commercial fisheries).	- Limited expertise and human resources. - Limited commitment and interest from local fisher's communities due to conflicts between conservation and economic interests – and not typically a conservation priority.	- Research on selective fishing method. - Onboard observer recruitment. - There is opportunity to promote local people as future conservation leaders. Especially, to strengthen awareness in local community (fishers and traders) - Opportunity to build capacity in local conservation organizations, government agencies and academic institution. - Opportunity to improve compliance by adding more trained human resource for monitoring and surveillance.
Resources	Currently marine conservation and fisheries is not a top priority in Indonesia national plan and receives insufficient resources from government allocation. However, in some utilization (tourism and fisheries) hotspots, shark conservation received considerable attention and	Currently, there is limited attention and sources of funding for conservation and fisheries management at the national level in Indonesia.	- Opportunity to strengthen advocacy for the species due to its ecological and economic importance. - Opportunities to establish network/alliance between NGOs, local authorities and academic institution to obtain resources, such as funding, personal

	resources needed to improve the management effectiveness by related government bodies, academic institution and NGOs is being supported by national and international funders.		resources and capacity building of local people. - Opportunities to attract global funding for shark conservation. In the next few years we predict that resources directed towards sustainable fisheries and Nature based solutions for coastal communities will be increasing as part of some international commitments (e.g. Conservation of Biological Diversity, the Paris agreement and the implementation of United Nations Decade of Ocean Science for Sustainable Development 2021-2030). -

2. ACTION PROGRAMME

Vision (30-50 years)	
Healthy Populations of Pelagic Thresher Sharks in Indonesian waters	
Goal(s) (5-10 years)	
• Large commercial shark fisheries are managed to achieve sustainable shark fisheries in Indonesia by 2030 • Small-scale and artisanal shark fisheries are managed to achieve sustainable shark fisheries in Indonesia by 2030 • Strengthen the management of domestic and international trade by 2030	
	Prioritisation *(low, medium, high or critical)*
Objective 1: Reduce bycatch mortality of pelagic thresher shark by encouraging live release in industrial/commercial fisheries particularly in purse seine and tuna longline fisheries by 2030.	Medium
Objective 2: Minimise industrial bycatch of pelagic thresher shark by 50%, through development and uptake of mandatory bycatch reduction strategy particularly in purse seine and tuna longline fisheries by 2030.	High
Objective 3: Strengthen the implementation of surveillance and monitoring system in all commercial fisheries vessel by 2030.	High
Objective 4: Develop mitigation plan, incentive and alternative livelihood scheme to reduce thresher shark catch in small-scale fisheries by 2030.	High
Objective 5: Estimate sustainable quotas for catch and for domestic and international trade by 2030.	Medium

Activities	Country / region	Priority *(low, medium, high or critical)*	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Reduce bycatch mortality of pelagic thresher shark by encouraging live release in industrial/commercial fisheries particularly in purse seine and tuna longline fisheries by 2030								
Develop best practice guideline for shark release in industrial-scale vessels	Indonesia	Medium	10,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Best practice guideline developed	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
Develop a Standard Operational Procedure (SOP) on shark release in industrial fisheries	Indonesia	Medium	10,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Standard Operational Procedure (SOP) developed	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
Develop a regulation with SOP(SOP)	Indonesia	Medium	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia	Regulation developed	Not enough interest in stakeholder and	Law & Policy

on shark release for industrial fisheries.					Institute of Science, Provincial Government. Universities, Research Centre, NGOs		Conflicts between conservation and economic interests	
Provide training for live releases for officer and vessel crew.	Indonesia	Medium	50,000	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Officer and Crew Trained	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Training & Capacity Building
Implementation of shark release strategy in industrial fisheries.	Indonesia	Medium	100,000 USD	4 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Implementation supported	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Implementation
Evaluation of shark release strategy implementation	Indonesia	Medium	25,000 USD	1 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial	Evaluation Conducted	Not enough interest in stakeholder and Conflicts between	Evaluation

					Government. Universities, Research Centre, NGOs		conservation and economic interests	
Objective 2: Minimise industrial bycatch of pelagic thresher shark by 50%, through development and uptake of mandatory bycatch reduction strategy particularly in purse seine and tuna longline fisheries by 2030.								
Research and data compilation for pelagic thresher bycatch in industrial fisheries	Indonesia	High	30,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Research conducted	Not enough interest in stakeholder	Research
Research of ecology and behaviour to avoid secondary bycatch	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Research conducted	Not enough interest in stakeholder	Research
Research of Bycatch reduction technology (BRT)	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial	Research conducted	Not enough interest in stakeholder and Conflicts between	Research

					Government. Universities, Research Centre, NGOs		conservation and economic interests	
Formulation for bycatch reduction strategies including the use of BRTs with 50% target reduction by 2030.	Indonesia	High	10,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Strategy formulated	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
Develop a regulation for Bycatch reduction Practice and the use of Bycatch Technology (BRTs) in industrial fishing	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Regulation developed	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
Implementing Bycatch reduction Practice and the use of Bycatch Technology (BRTs) in industrial	Indonesia	High	100,000 USD	4 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities,	Implementation supported	Not enough interest in stakeholder and Conflicts between conservation	Implementation

fishing					Research Centre, NGOs		and economic interests	
Evaluation of effectiveness of Bycatch reduction Practice and the use of Bycatch Technology (BRTs) in industrial fishing	Indonesia	High	25,000 USD	1 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Evaluation Conducted	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Evaluation
Objective 3: Strengthen the implementation of surveillance and monitoring system in all commercial fisheries vessel by 2030.								
Research and development in advance monitoring and surveillance technology (e.g. eDNA)	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Research conducted	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Research
Strengthen the implementation of catch monitoring and surveillance system using	Indonesia	High	50,000 USD	4 years	Ministry of Marine Affairs and Fisheries, Provincial Government.	Implementation supported	Not enough interest in stakeholder for the species, socio-economic barriers to BRT	Implementation

vessel cameras							adoption even if technology is available	
Strengthen the implementation of catch monitoring and surveillance system by onboard observers	Indonesia	High	100,000 USD	4 years	Ministry of Marine Affairs and Fisheries, Provincial Government.	Implementation supported	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Implementation
Evaluate effectiveness of shark monitoring and surveillance system to reduce thresher shark catch.	Indonesia	High	25,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Provincial Government.	Evaluation Conducted	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Evaluation
Objective 4: Develop mitigation plan, incentive and alternative livelihood scheme to reduce thresher shark catch in small-scale fisheries by 2030.								
Monitor and strengthen research on targeted catches, and their economic importance in Small-Scale Fisheries (SSF)	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre,	Monitoring and research conducted.	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Research

					NGOs, Customary Institution			
Research in mitigating thresher shark catch, including avoiding (spatio-temporal closures), minimising and remediating (live release)	Indonesia	High	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs, Customary Institution	Research conducted and Published	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Research
Implementation of thresher shark catch mitigation scheme	Indonesia	High	50,000 USD	4 years	Ministry of Marine Affairs and Fisheries, Provincial Government, NGOs, Customary Institution	Implementation supported	Resistance from fishers and traders	Implementation
Evaluation of thresher shark catch mitigation scheme	Indonesia	High	25,000 USD	1 years	Ministry of Marine Affairs and Fisheries, Provincial Government, NGOs, Customary Institution	System evaluated	Resistance from fishers and traders	Evaluation
Develop incentive-based mechanisms for small-scale fishers, e.g. to provide	Indonesia	High	50,000 USD	3 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities,	Mechanism developed	Resistance from fishers and traders	Law & Policy

alternatives or compensate for thresher catch in targeted fisheries.					Research Centre, NGOs, Customary Institution			
Implementation of incentive-based mechanisms	Indonesia	High	50,000 USD	3 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities, Research Centre, NGOs, Customary Institution	Implementation supported	Resistance from fishers and traders	Implementation
Evaluation of thresher shark catch mitigation scheme	Indonesia	High	25,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities, Research Centre, NGOs, Customary Institution	System evaluated	Resistance from fishers and traders	Evaluation
Develop alternative livelihoods for small-scale fishers who are targeting sharks (Tourism, marine culture, other commodities etc.)	Indonesia	Medium	25,000 USD	3 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities, Research Centre, NGOs, Customary Institution	Alternative livelihood developed	Resistance from fishers and traders	Community-based Management

Implementation of alternative livelihoods mechanisms	Indonesia	High	100,000 USD	5 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities, Research Centre, NGOs, Customary Institution	Implementation supported	Resistance from fishers and traders	Community-based Implementation
Evaluation of livelihoods mechanisms	Indonesia	High	25,000 USD	1 years	Ministry of Marine Affairs and Fisheries, Provincial Government, Universities, NGOs, Customary Institution	Evaluation Conducted	Resistance from fishers and traders	Community-based Evaluation
Objective 5: Estimate sustainable quotas for catch and for domestic and international trade by 2030.								
Research and data compilation for pelagic thresher catch and trade	Indonesia	High	30,000 USD	1 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Provincial Government. Universities, Research Centre, NGOs	Research conducted	Not enough interest in stakeholder	Research
Develop a Non-detriment Finding (NDF) to assess sustainability of	Indonesia	Medium	100,000 USD	3 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science,	NDF Recommendation developed and published	Not enough interest in stakeholder and Conflicts	Law & Policy

pelagic thresher shark					Universities, Research Centre, NGOs		between conservation and economic interests	
If NDF showing that the species can be utilized; develop catch quota	Indonesia	Medium	25,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Universities, Research Centre, NGOs	Catch Quota Set	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
If NDF showing that the species can be utilize, develop trade quota for domestic and international trade	Indonesia	Medium	25,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Universities, Research Centre, NGOs	Trade quota set	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy
Develop traceability system for thresher shark product trade.	Indonesia	Medium	50,000 USD	2 years	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Universities, Research Centre, NGOs	Effective traceability system developed	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Law & Policy

Evaluation of trade and traceability system of shark product	Indonesia	Medium	25,000 USD	1 year	Ministry of Marine Affairs and Fisheries, Indonesia Institute of Science, Universities, Research Centre, NGOs	Evaluation Conducted	Not enough interest in stakeholder and Conflicts between conservation and economic interests	Evaluation

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