The Federal Environmental Protection Authority

Guidelines on Fisheries

NOT FOR CITATION

This guidelines is still under development and shall be binding after consensus is reached between the Environmental Protection Authority and the Environmental Units of Competent Sectoral Agencies

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Introduction

These guidelines cover industrial and artisanal capture fisheries, culture fisheries, as well as the processing of fisheries products. Any fisheries project shall be undertaken through an integrated water resources management approach.

These guidelines aim to assist in developing fisheries projects that can address the themes of sustainability. They highlight major issues and potential impacts that should be taken into account during the preparation and assessment phases. The appropriate enhancement and mitigation measures should be integrated as early as possible, preferably in the project design.

1. Major Types of Intervention in the Fisheries Sub-Sector

Fisheries activities aim at obtaining food and other products from water bodies (ponds, lakes, creeks, rivers, seas). These activities involve catching, gathering, farming and raising aquatic organisms (fishes, crustaceans, molluscs and algae). Globally, there are two categories of fisheries, namely:

- capture fisheries;
- culture fisheries (aquaculture and mariculture).

These two categories can be carried out in seawater (near-shore and offshore), brackish water (estuaries, lagoons) and fresh water (inland). While inland and inshore fisheries as well as aquaculture are predominantly artisanal, deep-sea operations are primarily carried out on an industrial scale. Capture fisheries harvest natural stocks. The major methods include:

- seizing fish or shellfish in a net (seine, trawl) or trap;
- tangling fish in a net (gill, drift or trammel);
- catching with hook and line (anglers, longliners).

Culture fisheries involve resources management aiming at increasing the natural stock production. Fish farming achieves higher concentrations of fish or shellfish by:

- improving natural reproduction and growth conditions;
- raising resources in ponds;
- containing them in natural productive areas by using cages, pens or nets;
- providing substrates for the attachment of animals such as oysters;
- adding fish or shellfish in natural habitats.

The majority of inland aquaculture in the tropics is concerned with low-value finfish species and is mostly ponds based. Peri-urban aquaculture tends to be based on small-scale, semi-intensive or extensive ponds systems or intensive fry nurseries. In addition to capturing fish stocks, industrial fisheries projects include the construction and renovation of fish processing facilities and of port facilities for fisheries.

2. Specific Characteristics of a Fisheries Project

The description and justification of a fisheries project shall cover at least the following elements:

- Project location and siting, including a location map.
- History of fisheries activities and stock management in the area.
- Existing water uses and rights.
- Affected groups (directly and indirectly).
- Project characteristics, including facilities (processing buildings, wharf, services), harvest methods and expected production.
- Socio-cultural factors or constraints, such as customs and beliefs.
- Targeted fish species and justification.
- Natural and human resources requirements.
- Fishing effort (capture fisheries).
- Use of fertilisers, feeds and chemicals (culture fisheries).
- Source of water for aquaculture basins.
- Fisheries processing and storage methods: gutting, pealing, slicing, canning, freezing, drying and cooking.
- Marketing approaches.
- Temporary (during construction) and permanent infrastructures.
- Construction activities (excavation, waterways crossing, use of heavy machinery, etc.).
- Anticipated liquid, solid and gaseous emissions, and sources of nuisances (at construction and operation stages).
- Construction schedules and costs.
- Maintenance works, exploitation and associated costs.
- Means of preventing water contamination.
- Fisheries stock conservation and management measures.
- Consultation approaches and participation mechanisms.

3. Major Issues Related to a Fisheries Project

The main issues related to fisheries projects can be summarised as follows:

Components of sustainable development	Major Issues	Relevant or not
Economy Poverty	• Economic activity, employment and incomes. • Operations profitability. • Access to benefits for the poor and other vulnerable groups. • Skill and knowledge requirements. • Availability of and access to infrastructures and services.	
Environment	• Water quality. • Water resources availability.* • Introduction of exotic species.* • Water drainage.* • Fisheries stock management.** • Aquatic systems and habitat.	
Population	• Migration • Population characteristics and dynamics. • Traditional fisheries activities and local customs. • Land and water uses.* • Rights over aquatic resources. • Availability and use of aquatic resources. • Quality of life.	
Health Outcomes	• Communicable diseases. • Diet and food security. • Injuries.	
Gender	• Women's workload. • Participation in fisheries activities and control over proceeds. • Cultural barriers. • Access to facilities and services. • Women's involvement in decision-making processes.	
Participation	• Participation of affected groups in consultations. • Organisation level of fisheries producers and workers.	

* Specific to culture fisheries

** Specific to capture fisheries (both industrial and artisanal)

4. Potential Impacts, Enhancement and Mitigation Measures

The potential impacts outlined below are presented by crosscutting theme (one table per theme) to clearly identify the potential interactions between a fisheries project and a specific transversal issue.

4.1 Economy

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Economy	• Increase in fish production, generating additional revenues. • Substitution of fisheries imports by local production.* • Increased fisheries exports. • Increase in local development and employment. • Increase in commercial activities, thus in revenues for the local population. • Decrease in employment due to the mechanisation of fisheries activities.** • Constraints for producers to meet profitability objectives. • Exclusion of specific groups from project benefits. • Decrease in prices of fisheries products if the production sold on local markets increases. • Disruption in economic activities (navigation, tourism, etc.) related to water bodies.	• Give preference to local employment (men and women) and local inputs (food, basic material) to the extent possible. • Select fisheries production on the basis of commercial comparative advantages, environmental potentialities as well as preferences of the local population (men and women). • Ensure that commercial channels exist to sell fisheries production at competitive prices. • Base profitability estimates on conservative revenue assumptions. • Establish appropriate compensation mechanisms, recognising income and asset losses. • Identify why specific groups are not benefiting from the project and adopt corrective measures as required. • Ensure that the poor and other vulnerable groups can continue to satisfy their basic needs in fisheries products.

Economy cont…

Information, education and communication	• Development of additional skills related to cultivating, capturing and/or processing fisheries products. • Better information on fish habitat conservation. • Exclusion of specific groups due to a lack of knowledge. • Training not adapted to the specific needs of the various groups (e.g.: illiterate men and women, farmers converted to fisheries activities).	• Assist groups of individuals (men and women) who may lack the capacity to apply for participating into the project. • Develop and implement a literacy program especially aimed at poor people and women. • Provide fisheries producers, men and women, with the training required to maximize production and revenues while protecting aquatic resources (fishing techniques, management, commercialisation). • Ensure that fisheries do not have all the skills required due to a lack of experience (e.g.: extension services pay a special attention to producers and processors who artisanal approach in comparison to modern techniques).
Access to infrastructures and services	• Improvement in port facilities, increasing access to various goods.** • Improved access to credit for men and/or women. • Production losses and/or contamination due to inappropriate fisheries storage facilities. • Low productivity due to limited access to inputs.	• Involve users (men and women) in the management of new fisheries facilities to ensure their sustainability. • Provide minimal support to fisheries producers and processors (men and women) to organise activities complementary to their core activities (input purchase, technology, credit, commercialisation). • Implement control measures to guarantee products quality. • Establish user fees to ensure the maintenance of new facilities.

* Specific to culture fisheries
** Specific to capture fisheries

4.2 Environment

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Air	Proliferation of flies and odours nearby processing areas. Degradation of air quality due to the presence of processing facilities, incineration, trucks, etc. Increase in ambient noise around port facilities.**	Ensure proper zoning to minimise conflicts between inhabitants and fish processing industries. Implement appropriate solid waste disposal facilities. Minimise the incineration of waste by using other means of disposal (compost, landfill, etc.). Restrict truck circulation to specific routes and periods.**
Water	Degradation of water quality due to fish processing facilities (wastewater). Contamination of water quality by hazardous materials (hydrocarbons, chemical products, etc.) leaks and spills. Change in local hydrologic conditions by altering water flow and affecting groundwater recharge.* In fish ponds, loss of productivity due to water temperature rising, low oxygen concentration, accumulation of residues and acidification.* Water pollution from effluents rich in nutrients and containing some chemical products.*	Plan and implement wastewater disposal facilities. Implement public education programs for proper hazardous materials handling. Take all precautions during the refuelling of motorised equipment. Maintain motorised equipment in good condition in order to avoid leaks and discharge of hazardous materials. Provide storage and handling facilities for waste collection and disposal. Manage surface water according to good practices in order to minimise the impacts downstream of fish ponds.* Ensure water flow in fish ponds.* Avoid locating fish ponds in areas sensitive to acidification such as water saturated soils with high concentrations in pyrite and organic matter.* Regulate the use of antibiotics in fish farming.* Discharge effluents in water bodies with sufficient dilution capacity.* If the dilution is not possible, treat effluents before releasing them.*
Soil	During fish ponds construction, runoff erosion resulting in sedimentation problems.* Contamination of soils from spilling of hazardous materials.*	Avoid areas sensitive to erosion.* Minimise land clearing.* Restrict pond construction to dry periods.** Stabilise the soils in order to reduce potential erosion.* At the end of construction works, level off the soils and facilitate vegetation regeneration.* Ensure a safe management of hazardous materials (hydrocarbons, chemicals, etc.).*

Environment cont…

Ecosystems	Encroachment into ecologically sensitive and/or protected areas in order to establish new fish ponds.* Diver and anchor damages to sensitive ecosystems such as corals.** Degradation of ecologically sensitive habitats due to the construction and operation of port facilities.**	Design culture fisheries projects taking into account sensitive natural areas.* Forbid the construction of fish ponds in ecologically sensitive areas.* Intensify the management of existing fish ponds in order to discourage extensive aquaculture occupying large areas.* Educate fisheries producers and workers (men and women) on the effects of potential damages to sensitive ecosystems and ways to avoid such damages, such as using buoys and designated anchoring locations.** Locate port facilities in area not adjacent to ecologically sensitive habitats.**
Flora	Loss of vegetation due to the construction of fish ponds.* Loss of forest products (fuelwood, timber, non timber forest products).*	Plan for recuperating forest products obtained through land clearing and identify mechanisms to distribute the products to the local population.* Avoid to clear the vegetation along water bodies.* Favour the plantation of indigenous species.* Promote the development of community tree nurseries, preferably operated by women.*

Environment cont…

Fauna	Better management of existing fisheries stocks and more efficient use of existing resources.** Diversification of fish stocks.* Degradation of native stocks due to the introduction of exotic species. Local depletion of larvae and juvenile organisms for pond stocking.* Development of fish diseases when the population density becomes too important.* Overexploitation of fish stocks and degradation of the resource base.** Capture of non-target species.** Perturbation of fish habitats due to bad practices (explosives, poisoning).** Involuntary capture of fishes due to abandoned or lost fishing nets and traps.** Migration or perturbation of aquatic fauna due to dredging for port facilities.**	Discourage or forbid the introduction of exotic species without comprehensive study. Monitor indigenous species status if exotic species are introduced. Ensure the production of larvae and juvenile organisms in nursery.* Monitor fish stocks diseases and take appropriate actions to eliminate these diseases.* Avoid dredging in coastal areas by using existing port and harbour facilities.** Manage fisheries on a sustainable basis (restrictions, quotas, seasonal and areas closure, compulsory permits, regulations, traditional practices).** Develop new markets for non-target species.** Restrict bottom trawling.** Avoid use of fish poisons.** Sensitise fisheries producers and workers (men and women) on hazards linked to abandoned gears.** Assess stocks, develop management plans and implement international agreements over resources allocation.** Safeguard floodplains and fish hatcheries.**
Natural and cultural heritage	• Loss of cultural, religious and historical heritage as well as aesthetic resources. • Breach in agreements with traditional authorities concerning cultural, religious, historical and aesthetic sites and resources.	• Negotiate with traditional authorities the preservation of critical cultural, religious, historical and aesthetic sites and resources and agree on potential compensation for the communities. • Involve traditional authorities in monitoring cultural, religious, historical and aesthetic sites and resources during project implementation.

* Specific to culture fisheries
** Specific to capture fisheries

4.3 Population

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Demographic trends	• Project allocation criteria (for access to boats, jobs, credit, etc.) favour large families, encouraging population growth. • Increased population and ethnic diversity after migration of families interested in fisheries. • Temporary imbalance between men and women due to male migrants, which can lead to an increase in sexually transmitted diseases.	• Establish allocation criteria that are not based on family size, nor gender. • Work closely with host communities to facilitate the integration and acceptation of migrants. • Assist migrants in order to encourage their families to rapidly join them.
Migration and resettlement	• Inappropriate living conditions for migrants and their families. • Constraints in adjusting to resettlement and changes in productive activities. • Population pressure due to migrants attracted by new economic opportunities (in case of projects involving intensive employment creation).	• Plan adequate settlement areas with appropriate housing and services (water and sanitation) for migrants and their families. • Provide temporary food supplies to migrants if needed. • Provide complementary training /support to facilitate adjustment during the transition period. • Ensure adequate basic services, including water supply, to satisfy the needs of the host and migrant populations.

Population cont…

Natural resources and land management	• More efficient use of fisheries resources through improved marketing, distribution, processing and storage of fisheries products. • Important source of fish products for animal production. • Perturbation of traditional fisheries: preference for cash/export fisheries over subsistence fisheries. • Changes in land and water uses that may lead to social conflicts.* • Rivalries between users and owners of aquatic resources.	• Prevent food insecurity by allocating credit to subsistence fisheries. • Provide alternative income-generating activities to men and women loosing productive means (traditional fish processing, land, etc.). • Coordinate project activities with other land and water users (men and women). • Plan and manage aquaculture system in order to minimise water requirements.* • Regulate the establishment of fisheries ports in order to limit their scale.** • Involve all users of aquatic resources in the project design and clearly define ownership rights (communal/private, men/women, etc.) prior to project implementation.
Quality of life	• Increase in fish proteins in the diet and improvement in food security. • Improvement in quality of life due to new economic opportunities and adequate compensations for losses. • Change in local customs (means of subsistence and traditional fisheries activities). • Nuisances caused by increased boat traffic**, unpleasant odours and decreased quality of landscape.	• Establish a formal consultation mechanism with local authorities to discuss issues disturbing inhabitants and to find solutions satisfying all parties. • Involve local authorities in monitoring implementation activities and compensation agreements. • Ensure that part of the production is accessible on local markets. • In consultation with port users and affected populations, establish operations guidelines accommodating all parties.**

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** Specific to capture fisheries

4.4 Health Outcomes

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Communicable diseases	• Malaria, schistosomiasis, swimmer's itch. • Gastro-intestinal infections, e.g. parasitic diseases, diarrhoeas, cholera. • HIV and other sexually transmitted infections. • Skin infections (e.g. *Mycobacterium marinum*).	• Ensure quality control during fish processing and storage, e.g. hazard analysis and critical control point systems (HACCP). • Monitoring and managing, e.g. random monitoring for Salmonella and other pathogens and managing water quality. • Discourage eating raw aquatic organisms. • Establish labour camps at a reasonable distance from villages • Ensure steep margins and de-weeding of ponds.* • Antibiotic management.* • Avoid cultivating molluscs in wastewater.* • Ensure steep margins of reservoirs.** • Provide jetties to minimise reservoir water contacts.**
Non-communicable diseases	• Poisoning of consumers. • Allergy related diseases.	• Make random tests for antibiotic residues and other chemical contaminants. • Ensure use of gloves and washing skin before and after contact with fish by workers. • Avoid use of waters contaminated with industrial effluents such as mercury. • Stop harvesting when algae blooms occur.
Malnutrition	Increased food supply. • Malnutrition due to a reduction in fish proteins. • Stunting or wasting in children.**	• Safeguard subsistence fisheries.
Injuries	• Drowning and fall injury. • Snake bite.*	• Inform workers and monitor occupational safety. • Build small dams to improve safety standards.* • Implement storm-warning systems.**

Health Outcomes cont…

Psychosocial disorders and well-being	Stress and anxiety associated with rapid social change, loss of traditional authority, loss of spiritual assets, uncertainty and locus of control, severance, exclusion, and marginalisation, gender related problems, alcoholism, domestic disputes leading to suicide, physical and mental abuse, child marriage, labour and sale, and communal violence. • Well-being associated with improved income, stability, work opportunities, access to basic services, health, empowerment, education and training.	Refer to measures proposed under other crosscutting themes as those address many causes of psychosocial disorders and factors contributing to well-being.

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4.5 Gender

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Division of labour (paid and unpaid work)	• Change in time spent by children and women on fisheries activities. • Increased workload for women as their reproductive work is not reduced.	• Establish rules among producers to limit child work. • Provide adapted technologies to both women and men to reduce time spent on fisheries activities. • Plan support initiatives to reduce women's reproductive workload.
Income generating activities (money or kind)	• Increased income for women when their work is remunerated or fisheries revenues shared. • Decreased income for women who cannot carry out anymore traditional fisheries activities (e.g.: processing) or others. • Limited participation of women in project benefits due to cultural barriers.	• Offer employment opportunities to men and women, encourage women to apply and select candidates according to their competencies. • Ensure that men and women working on the project have access to revenues. • Ensure that women get remunerated for their work, especially if they do not get a share of the revenues. • Ensure that women are directly paid for their work, without involving any intermediaries. • Give an opportunity to women already involved in fisheries activities to participate in the project and to maintain or increase their income level (in cash or kind). • Do not restrict women to low-income processing activities. • Ensure that project promoters do not reinforce cultural barriers affecting negatively women, such as by excluding women from non-traditional fisheries occupations. • Facilitate women involvement in fishing activities.

Health Outcomes cont…

Access to and control over productive factors	• Women affected by the restricted access to fisheries products for processing, an activity traditionally controlled by women. • Unequal access to training for women and men producers. • Limited access of women to services offered to producers.	• Provide an opportunity to women already involved in fisheries activities to maintain their activities if they do not want to participate in the project. • Provide men and women involved in the project with an equivalent access to training and services (storage, commercialisation, credit, etc.). • Ensure that extension services offered to men and women are gender sensitive. • Ensure that new facilities (including credit) are adapted to the specific needs of men and women.
Involvement in societal organisation	• Women get organised to obtain training in fisheries adapted to their specific needs. • Low representation of women in decision-making processes related to fisheries activities.	• Facilitate the creation of women groups when women express an interest in being better organised and represented. • Involve women and men in committees established to manage and monitor aquatic resources and fisheries activities. If cultural barriers do not allow mixed structures, develop independent structures for women.

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** Specific to capture fisheries

4.6 Participation

Component	Potential Beneficial and Adverse Impacts	Enhancement and Mitigation Measures
Consultation	• Integration of men's and women's concerns into the project design. • Increased support for the project among affected populations. • Exclusion of specific groups from consultations, particularly women already involved in fisheries activities.	• Consult affected people at all phases of the project. • Provide the opportunity to all affected groups (men and women) to participate in consultations by offering adapted consultation mechanisms. • Use consultations to determine traditional patterns of right and responsibilities concerning fisheries and to identify ways to increase the involvement of excluded groups (men and women). • Inform consulted men and women on how their concerns were taken into account.
Civil society strengthening	• Creation of new groups and organisations. • Disruption of existing organisations or co-operative involved in traditional fisheries.	• Ensure that men and women have the opportunity to organise themselves in groups representing their interests. • Integrate existing associations within the new groups and organisations or establish collaboration.

* Specific to culture fisheries
** Specific to capture fisheries

5. External Factors

The major external factors that may influence the outcomes of a culture or capture fisheries project are the following:

- **Water pollution from industrial, domestic, agricultural or animal sources**

Industrial and domestic effluents, as well as pollution from agricultural and animal production, can represent important sources of degradation of the fish habitat (water quality). To minimise the risks of water pollution, it is recommended to take into account the location of these potential sources of contamination while planning a fisheries project.

- **Soil erosion**

Soil erosion generated by various human activities, such as agriculture, roads and land clearing, causes sedimentation in water bodies affecting fish spawning grounds. The implementation of integrated watershed management techniques is recommended to minimise soil erosion in watersheds.

- **Flood control measures and dams (water regulation)**

Flood control measures and dams can influence water quality and quantity, which has a direct impact on the fish habitat. Integrated watershed management is also recommended for minimising the influence of flood control measures and dams on fisheries projects outcomes.

- **Navigation**

Navigation can be the cause of water quality degradation and conflicts for water use. In order to minimise these risks, it is recommended to implement water protection measures and coordinate fisheries activities development with governmental authorities in charge of navigation.

- **Economic factors**

Economic factors such as a fall in market prices and the banning of products by importing countries involve reduced fisheries revenues and potentially financial losses that can force to cease operations. To reduce financial vulnerability, the producers' debts shall be minimised. Moreover fisheries production and markets shall be diversified, in particular by favouring the production of value-added products.

- **Social Instability**

The emergence of community disputes are phenomena that generate social instability and can lead to migration, disruption of the food chain, water contamination and intermittent supply, injuries, epidemics and mortality. Good governance and poverty alleviation policies are means to prevent social instability.

6. Hazard Management

The main hazard associated with fisheries projects is the following:

- **Hazardous materials spills**, resulting in injuries (burns, explosions) and human and animal poisoning.

In order to prevent or minimise this hazard, appropriate risk management measures shall be designed and implemented.

7. Environmental Monitoring

The following tables present the potential indicators that could be used to monitor the implementation of a fisheries project. The appropriate indicators for a specific project shall be selected according to the project context, major anticipated impacts and the cost of data collection and processing.

Component	Indicators
Poverty	
Economy	• Annual revenues and profits generated by fisheries activities compared to projected revenues and profits. • Number of jobs created (directly and indirectly). • Number of producers failing to reimburse their debts. • Level of satisfaction of adversely affected groups (men and women) toward compensations and offered alternatives. (survey)
Information, education and communication	Understanding of fisheries and management concepts by trained men and women producers.
Access to infrastructures and services	• Fisheries input availability as a function of the demand (quantity and timeliness). • Adequacy of storage facilities to the demand (quantity and quality). • Proportion of the production lost before being sold. • Revenues from tax/tariff on new facilities and allocation.
Environment	
Water	Concentration of pollutants (suspended solids, oil and grease, DBO, nitrogen and coliforms). Water flow downstream.*
Soils	Evolution of erosion signs.* Volume of sedimentation downstream of fish ponds.*
Ecosystems	Surface of sensitive areas affected by the project (encroachment, sedimentation on spawning grounds, river banks erosion, etc.).* Surface of sensitive coastal ecosystems affected by the project (e.g. corals, mangroves, reproduction areas, etc.).**

Environmental Monitoring cont…

Fauna	Species evolution in nearby waters (for aquaculture projects of exotic species).* Fish diseases or parasites.* Aquatic resources population and size.** Fish landings.**
Natural and cultural heritage	Natural and cultural sites affected by the project.
Population	
Demographic trends	Population growth and ethnic composition.
Migration and resettlement	Integration level of migrants in host communities (survey). Number of informal settlements built by migrants.
Natural resources and land management	. Subsistence fisheries products in calories per inhabitant. . Number of conflicts among users of aquatic resources.
Quality of life	Evolution of fish proteins consumption.
Health Outcomes	
Communicable diseases	Disease incidence rates and drug consumption rates. Results of product and installation quality control (HACCP). Proliferation of night-clubs and bars around fishing harbours.**
Non-communicable diseases	Reported cases of food poisoning. Results of monitoring for contaminants, including antibiotic residues.
Malnutrition	Height/weight changes in school children of affected communities. Scarcity of wild fish stocks.**
Injuries	Injury and fatality rates on works sites. Knowledge on occupational health and safety measures on fishing vessels and in fish processing plants.** Efficiency of storm-warning systems.**
Gender	
Division of labour	. Time spent by men, women and children on fisheries activities and other activities before and after the project.
Income-generating activities (money or kind)	. Proportion of income received and managed by men and women involved in fisheries activities. . Level of satisfaction of women toward project investment decisions and management methods (survey).
Access to and control over productive factors	. Proportion of men and women involved in fisheries by type of activity. . Number of women and men using facilities (storage, credit, etc.).
Involvement in societal organisation	Proportion of men and women in committees established to manage and monitor aquatic resources and fisheries activities.
Participation	
Civil society strengthening	. Evolution in the number of fisheries organisations. . Conflicts among new and existing organisations involved in fisheries.

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** Specific to capture fisheries