



**Establishment and Operation of a Regional System of
Fisheries *Refugia* in the South China Sea and Gulf of Thailand**

REPORT

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1. INTRODUCTION

The South China Sea and Gulf of Thailand is a global centre of shallow water marine biological diversity, supporting a significant world fishery that is important to the food security of, and as a source of export income for, Southeast Asian countries. Landings from this area contribute approximately 10 percent of reported global fisheries production per annum and make significant contributions to the economies, of countries bordering the Gulf of Thailand and the South China Sea (UNEP, 2007a). The majority of fisheries are small-scale in nature, and fish are landed in a large number of decentralised locations for distribution through complex marketing networks at the community level. As a consequence, estimates of fisheries production are considered to be gross underestimates and do not adequately reflect the importance of the artisanal or subsistence production to the fisheries sector as a whole.

The majority of Southeast Asian countries are among the top 20 capture fisheries producing countries in the world, with some experiencing annual increases in production of up to 5 percent. Pelagic fishes dominate landings by volume and value, as most demersal fisheries are over-exploited (Lundgren *et al.* 2006). It is well accepted, however, that regional fisheries statistics rarely reflect: (a) production from small-scale coastal fisheries, (b) the high level participation of coastal communities in fishing, or (c) the social and economic importance of artisanal and subsistence fishing to coastal communities.

Fish stocks in the South China Sea and Gulf of Thailand are subject to high levels of fishing effort, such that stocks of most economically important species are considered to be fully fished or overexploited. Increasing global demand for fisheries products; and the dependence of coastal communities on fish for food and income results in a continued increase in fishing effort. This has led to “fishing down the marine food chain in the region” (Christensen, 1998), coupled with an increasing dependence of the artisanal sector on small pelagic species due to declining availability of demersal species.

The fisheries and habitat components of the UNEP/GEF South China Sea Project focus on the critical role that habitats such as mangroves, coral reefs, seagrass, and wetlands play in sustaining fisheries production in the South China Sea and Gulf of Thailand. These habitats are known to act as refuges for most economically important fish species during critical stages of their life-cycles including as larvae, for spawning, and for feeding. These habitats therefore play an important role in recruitment and maintenance of fish stocks.

Declining fish availability, coupled with over-capacity and the dependence of the small-scale sector on coastal fisheries for income generation, has led to the adoption of destructive fishing practices by some fishers in order to maintain incomes and food production in the short-term. Fisheries trends suggest that production from capture fisheries will decline over coming years unless total fishing effort and capacity are reduced (Lundgren *et al.* 2006). The obvious problem in the reduction of fishing capacity is that most fisheries are small-scale with the majority of participants (and their families) being highly dependent on fisheries for income, food and well-being.

The fisheries *refugia* concept as developed by the Regional Working Group on Fisheries (RWG-F) is based on the use of area-based or zoning approaches to fisheries management aimed at maintaining the habitats upon which fish stocks depend, as well as minimizing the effects of fishing on stocks of important species in areas and at times critical to their life cycle. The fisheries *refugia* concept promotes the sustainable use of fish stocks and their habitats, and the use of criteria for the selection of sites for fisheries and habitat management interventions that focus on fish life-cycle and critical habitat linkages.

2. PROGRAM OBJECTIVES

GENERAL

Resource-Related Objectives

Longer-Term Objectives

1. Biomass of economically important fish (pelagic and demersal) and invertebrate species in the Gulf of Thailand and South China Sea maintained
2. Average size of economically important fish (pelagic and demersal) and invertebrate species caught in the Gulf of Thailand and South China Sea maintained or increasing
3. Egg production of economically important fish and invertebrate species in the Gulf of Thailand and South China Sea maintained or increasing
4. Recruitment of economically important fish and invertebrate species to fisheries the Gulf of Thailand and South China Sea maintained or increasing

Shorter-Term Objectives

1. Reduced capture of juveniles and pre-recruits of economically important fish (pelagic and demersal) and invertebrate species, as well as endangered species, in critical fisheries habitats of the Gulf of Thailand and South China Sea
2. Reduced targeting and capture of economically important fish (pelagic and demersal) and invertebrate species in spawning condition, and when forming spawning aggregations, in the Gulf of Thailand and South China Sea
3. System of fisheries *refugia*, including both juvenile and spawning *refugia*, which provides for:
 - Networks of fisheries *refugia* across the geographical ranges of individual species,
 - Networks of fisheries *refugia* that include both juvenile and spawning *refugia*,
 - Fisheries management consistent with the RGRFSEA

3. MATERIALS AND METHODS

The project has 4 project components.

Component 1. Identification and management of fisheries and critical habitat linkages at priority fisheries *refugia* in the South China Sea.

Establishment of operational management at 3 priority fisheries *refugia*, with community-based *refugia* management plans being key outputs. Supporting activities include consultative processes to facilitate agreement among stakeholders on the boundaries of fisheries *refugia*, identification of key threats to *refugia* sites, recording of fishing community view regarding appropriate fisheries and habitat management measures, and eliciting stakeholder inputs to management plan review. *Refugia* management plans will provide rules *inter alia* on operating requirements for the use of particular classes of fishing vessels or fishing gear within *refugia*, procedures for adjusting management measures over time, and mechanisms for enforcement. Specific direction is given to drafting of regulations and ordinances required in support of plan implementation.

Component 2. : Improving the management of critical habitats for fish stocks of trans-boundary significance via national and regional actions to strengthen the enabling environment and knowledge-base for fisheries *refugia* management in the South China Sea.

Preparatory activities for this component includes legal reviews to identify, *inter alia*: legal terminology for describing *refugia*; formal procedures for demarcating boundaries of spatial management areas such as *refugia*, including requirements for assessing the socio-economic impacts of management measures and stakeholder consultation; and provisions for decentralizing *refugia* management to the community level via development of co-management and rights-based approaches. These national reviews are aimed at informing the drafting of required policy and legislative amendments for adoption by competent authorities. This component will also build

the national and site-level science and information base required to inform the monitoring and evaluation of the effectiveness of individual *refugia* and the regional network of sites.

Component 3. Information Management and Dissemination in support of national and regional-level implementation of the fisheries *refugia* concept in the South China Sea.

Strengthening information management and dissemination aimed at enhancing the national uptake of best practices in integrating fisheries management and biodiversity conservation, and in improving community acceptance of area based approaches to fisheries and coastal environmental management. Supporting activities involve the development of national knowledge management systems on the use of fisheries *refugia* in capture fisheries management, and the establishment of a Regional Education and Awareness Centre that will operate as a facility for the production and sharing of information and education materials on fisheries and critical habitat linkages in the South China Sea. Importantly, Component 3 will support the development of indicators to monitor the effectiveness of coastal fisheries management systems established for priority fisheries *refugia*. A regional program for the compilation of standardized fisheries statistics for use in identifying and managing fisheries *refugia* will also be developed to support longer-term management.

Component 4. National cooperation and coordination for integrated fish stock and critical habitat management in the South China Sea.

At the national-level, Component 4 will strengthen cross-sectorial coordination for integrated fisheries and environmental management and will harness the national scientific and technical expertise and knowledge required to inform the policy, legal and institutional reforms for fisheries *refugia* management in the participating countries. Local community action and strengthened community to cabinet' linkages will be facilitated via establishment and operation of site-based management boards for fisheries *refugia* at the 14 priority locations in the South China Sea. Regionally, Component 4 will foster regional cooperation in: the establishment and operation of a regional system of fisheries *refugia*; and in the integration of scientific knowledge and research outputs with management and policy making. This component also includes project coordination and management activities aimed at: ensuring the timely and cost effective implementation of regional and national-level activities; and satisfying the reporting requirements of UNEP and the GEF.

4. PROJECT PERFORMANCE AND RESULTS

4.1. INFORMATION-DRIVE FOR COASTAL BARANGAYS

The information-drive was convened to specifically inform and educate the coastal communities on the establishment of the fisheries *refugia* in each municipalities. The objectives of the information-drive were to provide knowledge about the concepts of Fisheries *Refugia* site; to guide participants in understanding the importance of Fisheries *Refugia*; and to present data results of the Fish Eggs and Larvae Survey, and Fish Data Collection in Fish landing sites in each *refugia* sites. The three information-drive at the *Refugia* sites were all well attended. The participants were the fisherfolk from the coastal barangays identified by the LGU who are included in the proposed boundary of the fisheries *refugia* sites.

Table 1. Number of participants by Gender

<i>Refugia</i> Site	Men	Women	Total
Bolinao, Pangasinan	119	19	138
Coron, Palawan	76	22	98
Masinloc, Zambales	132	36	168

The number of participants by gender is shown in table 1. A total of 138 fisherfolk participated the Information Drive of the Fisheries Refugia Project and was assisted by 2 members of the LGU headed by the MFARMC of Bolinao, Mr. Jesem Gabatin; 168 fisherfolk from Masinloc assisted by 5 members of the LGU headed by the Municipal Agriculturist of Masinloc, Mr. Elmar Pulido; and 105 fisherfolk assisted by 2 BFAR MIMAROPA Law Enforcers in Coron, Palawan. The lead facilitator for the information-drive activity was Mr. Noel C. Barut supported by Mr. Valeriano Borja - National Scientific and Technical Focal Point, Raziel Ares - Technical Project Assistant and Lilibeth Abina – Project Administrative Staff. The information-drive in the three sites were conducted last February 18-20, February 25-27, and March 3-5, 2020 for Bolinao, Masinloc and Coron, respectively. The program of activities was the same in the three *refugia* sites.

During the activity, National Technical Adviser for the Fisheries *Refugia* Project in the Philippines, Mr. Noel Barut, gave an introductory discussion about the Fisheries *Refugia* Concept followed by the presentation of the Results of Fish Data Collection in the Landing Sites by Mr. Valeriano Borja. After which, an open forum was conducted to address the questions and concerns of the fisherfolk regarding fisheries *refugia* and its implementation.

In general, the information-drive was successful. The participants were supportive and very cooperative in suggesting activities that will give them more knowledge in conserving and protecting the *refugia* site. One of the participants even voiced out that there concerns about the existing MPAs in the municipality. Most of the participants appreciated the discussion on the commonly important species in their area. Moreover, the additional knowledge they gained in learning the results of the fish eggs and larvae sampling which allowed them to comprehend the importance of protecting the spawning and nursery *refugia* of their priority species. Lastly, good thing the project acknowledged is the honesty of the fisherfolk and other participants coming from the different sectors of the community to learn and understand more about fisheries *refugia*. As part of the important activities that the project can provide the fisherfolk is to at least allocate some time for information dissemination in all activities of the project in the project sites in order to empower and share the significance of fisheries management in the economic opportunity and habitat protection of the municipality.

4.2. MEETINGS

4.2.1. 3RD REGIONAL SCIENTIFIC AND TECHNICAL COMMITTEE MEETING

Last February 5-7, 2020, the Fisheries *Refugia* Project in the Philippines, participated in the 3rd Regional Scientific and Technical Committee Meeting for the SEAFDEC/UNEP/GEF Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand held in Hoang Long Hotel, Hai Phong City, Viet Nam which was represented by Mr. Valeriano Borja, the National Scientific and Technical Focal Point. Agenda of the meeting were reporting of the progress work of the project activities as of December 31, 2019; presentation of fisheries *refugia* profiles for 3 sites, and data information for the fish eggs and larvae survey and fisheries data collection.

4.2.2. BOLINAO REFUGIA SITE MANAGEMENT COMMITTEE MEETING

Bolinao *Refugia* Site Management Committee had a quarterly meeting last February 6, 2020 in Bolinao, Pangasinan. The meeting was convened by the Fisheries *Refugia* Team which started at 9:00 AM, presided by the National Technical Adviser of Fisheries *Refugia* Project in the Philippines, Mr. Noel Barut. A total of 22 participants was present in the meeting. The agenda of the meeting were the Executive Order organizer the management committee and TOR, updates and accomplishment of the project, 2nd Project Steering Committee Meeting result, and discuss work plan for 2020.

The chairperson of the meeting, Hon. Alfonso Celeste, suggested for a total banning of “Padas” fishing as it was observed and confirmed that municipal ordinance regarding the species is just for close season. Moreover, a revision of the executive order organizing the members of

the *Refugia* Site Management Committee was suggested by the majority of the committee in order to update the offices/agency included as well as the focal persons.

4.2.3. AD-HOC PROJECT STEERING COMMITTEE MEETING

The 1st Ad-hoc meeting for the Project Steering Committee was convened and organized by the SEAFDEC/Project Coordinating Unit last June 16, 2020 thru a Zoom Teleconference. Discussed in the meeting was the possible extension of the project and the 2nd Budget Revision. Details of the meeting were forwarded in a hard copy document to BFAR Director and Undersecretary for Fisheries, Commodore Eduardo B. Gongona, and Dr. Lilian C. Garcia, Interim Executive Director of NFRDI.

4.3. SPAWNING AREA

Collection of ichthyoplankton was conducted in Bolinao Bay, Masinloc Bay and Coron Bay with 6-8 sampling stations from 2017-2019. After a series of sampling in a quarterly basis, the spawning area for the top three fish families in each *refugia* sites were established as shown in the figures.

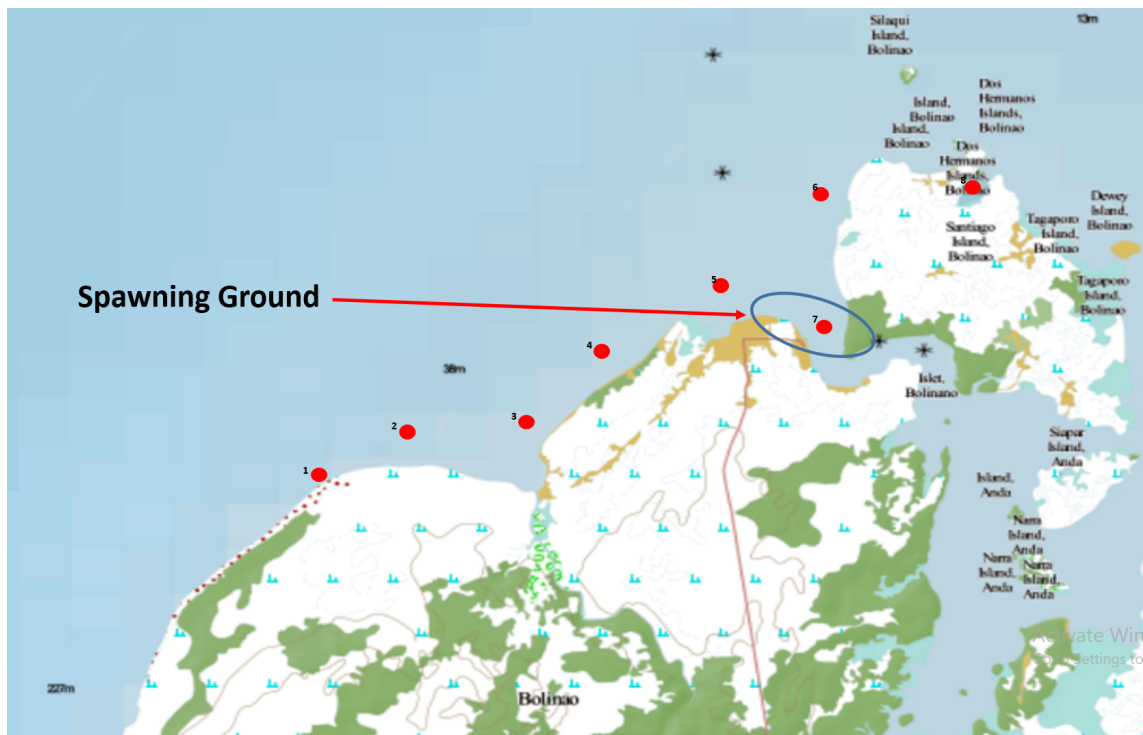


Figure 1. Spawning Area of Top Species in Bolinao, Pangasinan

Figure 1 shows the map of the sampling stations for fish eggs and larvae survey in Bolinao, Pangasinan. There are 8 sampling stations in Bolinao Bay where station 7 was observed to have highest number of eggs. Top families collected from Bolinao Bay are Siganidae, Carangidae and Acanthuridae. This result supports, *Siganus guttatus* from family Siganidae, selected by the Bolinao Refugia Site Management Committee (RSMC) as their priority species.

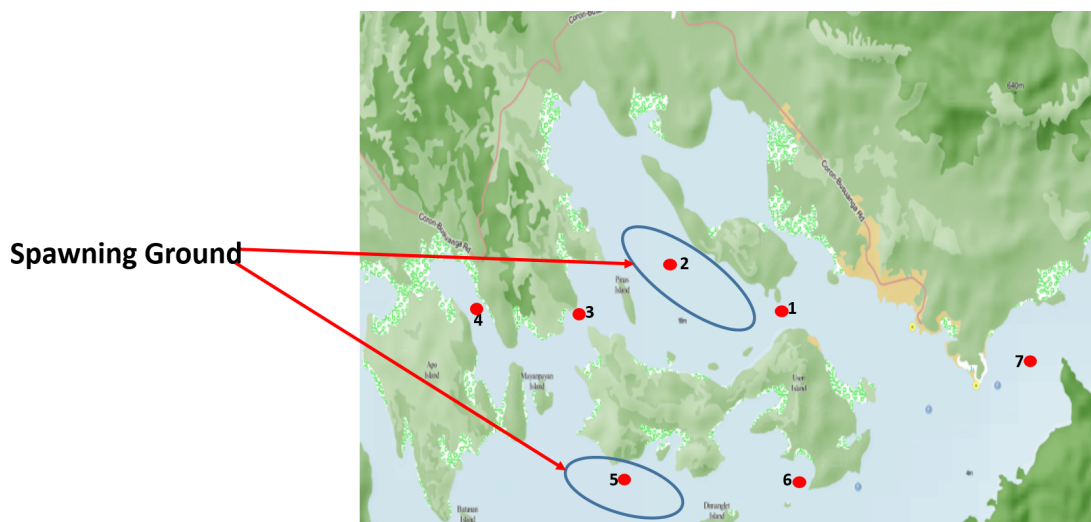


Figure 2. Spawning Area of Top Species in Coron, Palawan

The spawning ground for Coron is shown in Figure 2. Out of 6 sampling stations, dominance in fish eggs were observed in stations 2 and 5 were families Caesionidae with highest number of eggs, followed by both Clupeidae and Carangida, and Lutjanidae. RSMC in Coron selected *Lutjanus argentimacularus*, commonly known as Mangrove Jack as their priority species which is among the top families of fish eggs collected in Coron Bay.



Figure 3. Spawning Area of Top Species in Masinloc, Zambales

The figure above shows the spawning ground of the top species in Masinloc, Zambales. There are 6 sampling stations in Masinloc Bay were Station 4 was observed to have the highest number of fish eggs. Among the top families of fish eggs observed in Masinloc Bay were Siganidae, Carangidae and Scrombidae thus RSMC selected *Auxis thazard* as the priority species for the municipality of Masinloc.

4.4. OTHER UPDATES

Project activities for the 2nd quarter of 2020 including the committee meetings for 2 *refugia* sites, Coron, Palawan and Masinloc, Zambales, were rescheduled due to the pervasive effects of the Covid-19 pandemic that affected the project implementation for all the ASEAN participating countries. Other trainings for this year such as the Management Plan Writeshop, Marine Spatial Tool Planning Workshop and Law Enforcement Trainings were also rescheduled for later this year.

Moreover, the major difficulties experienced by the technical enumerators in the collection of Fisheries Data of 3 *refugia* sites were brought about by the strict community quarantine protocols implemented in each municipality causing delays transfer of collected data as well as halted sampling in the landing centers.

5. APPENDICES

APPENDIX 1



Actual Photos during the Information-Drive Activity in Bolinao, Pangasinan

APPENDIX 2



Actual Photos during the Information-Drive Activity in Masinloc, Zambales

APPENDIX 3





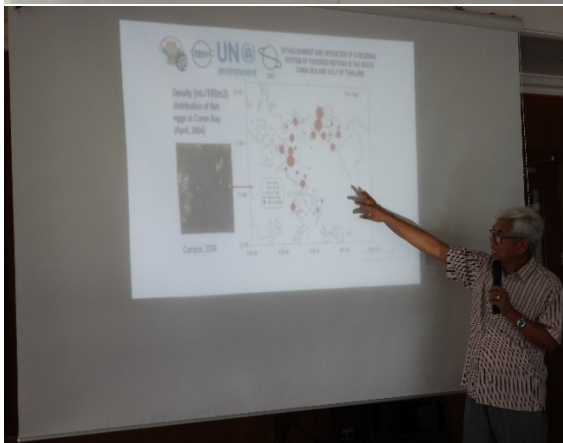
Actual Photos during the Information-Drive Activity in Coron, Palawan

APPENDIX 4



Actual Photos during the RSTC Meeting in Hai Phong, Viet Nam

APPENDIX 5



Actual Photos during the Information-Drive Activity in Coron, Palawan

APPENDIX 6

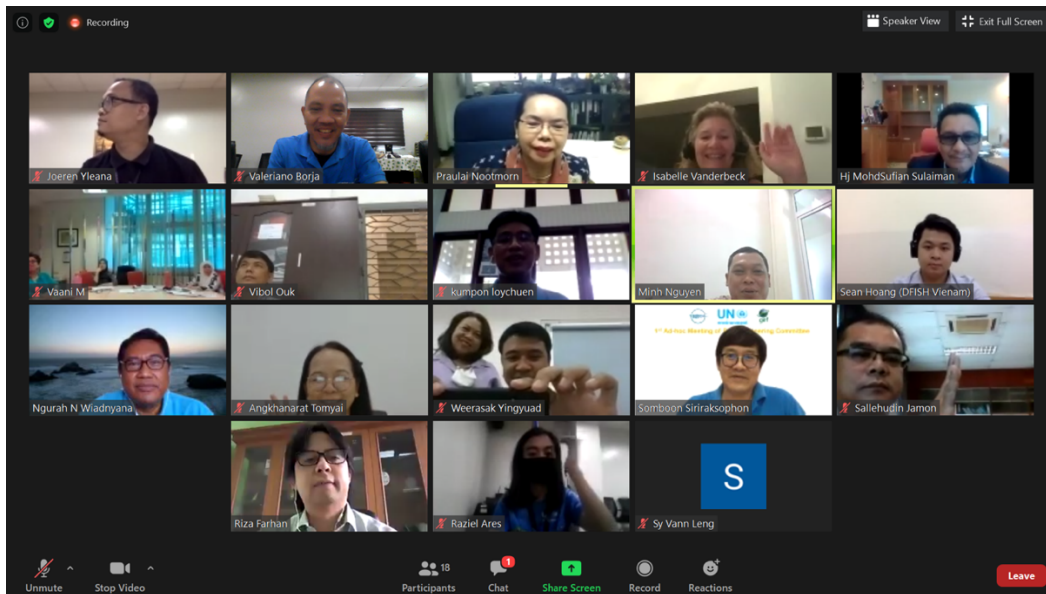
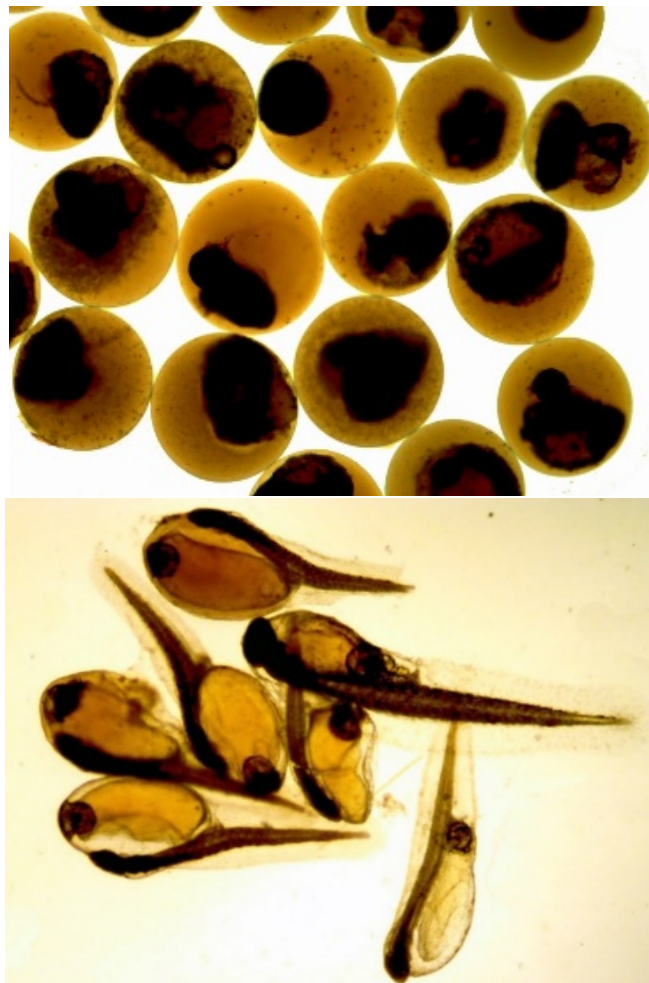


Photo taken during Ad-hoc Project Steering Committee Meeting

APPENDIX 7



Actual Photos of Fish Eggs and Larvae sampled from *Refugia* sites