

1. Outline of the Project		
Country name: Argentina		Project name: The Project of Research and Development of Pejerrey Aquaculture and Propagation
Fields: Fisheries		Assistance type: Technical cooperation project
Supervising office: Fisheries Cooperation Team, Third Group, Rural Development Department		Monetary amount of cooperation: Approx. 160 million yen
Period of cooperation	R/D: September 10, 2002, to September 9, 2005	Counterpart organizations: National Council for Scientific and Technical Research; Instituto Tecnológico Chascomús (INTECH); Ministry of Agricultural Affairs, Buenos Aires Province; Estación Hidrobiológica de Chascomús (EHC)
	Extension:	
	F/U:	
		Cooperating organizations in Japan: Tokyo University of Marine Science and Technology (formerly Tokyo University of Fisheries), Kanagawa Prefecture
		Other associated cooperation:
<p>1-1 Background and outline of the Project</p> <p>For the effective use of pejerrey resources, the provincial government of Buenos Aires has been producing fertilized eggs and hatched larvae through artificial reproduction and releasing them into water bodies in the province since the 1940s. Fertilized pejerrey eggs have also been taken to other provinces as well as outside of Argentina. However, such activity has not significantly contributed to the formation and increase of pejerrey resources in natural waters due to severe initial attrition. At the same time, pejerrey resources have been decreasing dramatically because of over-fishing and abnormal climatic conditions that are thought to have impacted on pejerrey reproduction.</p> <p>Under these circumstances, the provincial government of Buenos Aires, National Institute of Fisheries Resource Development (INIDEP), National Council for Scientific and Technical Research (CONICET), University of Buenos Aires (UBA), provincial government of Neuquén, and others have been engaged in research on pejerrey</p>		

propagation and culture based on their serious concern for declining pejerrey resources. However, a lack of basic research on the physiology, ecology, breeding, and propagation of pejerrey and insufficient development of technologies that are suited to the region have meant that favorable results have been unattainable. In order to resolve this situation, the fisheries development bureau of the provincial government of Buenos Aires submitted a request to Japan for dispatch of an expert. Based upon the request, a JICA expert was dispatched to the region from November 2001 to May 2002. This resulted in the suggestion that technical support could be provided by making use of pejerrey aquaculture techniques that were established by Japan using pejerrey that were brought to Japan by Japanese emigrants as a symbol of Japan-Argentina friendship. Based on a request for cooperation from the abovementioned Argentine organizations researching pejerrey aquaculture, a preliminary evaluation team was dispatched to Argentina in May 2002, which in turn led to a decision to implement a technical cooperation project entitled "The Project of Research and Development of Pejerrey Aquaculture and Propagation."

#### 1-2 Description of cooperation

##### (1) Overall Goal

Model pejerrey farming and other related forms of production are executed in the Chascomús area and its surroundings.

##### (2) Project Purpose

Basic techniques for pejerrey aquaculture will be established.

##### (3) Outputs of the project

- 1) Pejerrey seed production techniques are developed
- 2) Mass seed production techniques for pejerrey are investigated.
- 3) A plan for pejerrey aquaculture is prepared
- 4) Aquaculture is improved through reflection of monitoring and evaluation results

##### (4) Inputs (at time of evaluation)

###### Japanese side

Dispatch of long-term experts:	3 experts
Dispatch of short-term experts:	4 experts
Training of C/Ps in Japan:	8 C/Ps
Provision of equipment and machinery:	6 million yen

Assumption of local costs:	20 million yen
Argentine side	
Allocation of C/Ps:	11 C/Ps
Assumption of local costs:	33,000 USD (excluding personnel expenses)
Provision of research facilities, supplies, and equipment	

## 2. Outline of the Evaluation Team

Members	Team leader:	Juichiro Sasaki	Team Director, Fisheries Cooperation Team, Rural Development Department, JICA
	Fish aquaculture:	Kunihiko Fukusho	Director, Breeding and Exhibit Department, Port of Nagoya Public Aquarium
	Evaluation analysis:	Ayako Watanabe	Senior planner/researcher, International Division, Regional Planning International Co., Ltd.
	Cooperation planning:	Shinya Tamio	Project Officer, Fisheries Cooperation Team, Rural Development Department, JICA
Evaluation period	May 28, 2005, to June 18, 2005	Evaluation type: Final evaluation	

## 3. Outline of Evaluation Results

### 3-1 Confirmation of achievements

#### (1) Activities

The team found that the progress of the Project activities was on schedule as a whole. In particular, the team recognized that preparation of an aquaculture plan had already exceeded the Project framework in some instances to reach the verification test stage, and that public relations activities were being actively implemented. Activities concerning seed marking had, through activities implemented thus far, reached the stage at which seed production techniques were established and where study was about to begin, and it is expected that activity here will be implemented by the end of the Project.

#### (2) Outputs

It was confirmed that the Outputs have already been or are expected to be achieved by the end of the Project. For “establishment of seed production techniques,” the Project produced two million high-quality eggs and established basic natural and induced spawning techniques. Also, suitable natural feeding regimes for larval rearing were clarified, and comparatively low-cost artificial feeds were developed using materials that are available in Argentina. Work to identify genetic characteristics is still in progress but is expected to be finalized by the end of the Project Period.

“Establishment of mass seed production techniques for pejerrey” is almost complete. Establishment/installation of facilities and equipment is complete, and techniques for mass-production of food organisms have been established. These accomplishments have led to increases in both the survival and growth rates of juveniles. Methods for parasite control have also been established to combat fish diseases. The Project has just reached the stage where study of seed marking methods will begin based on the establishment of seed production techniques. A technical report on this issue will be prepared by the end of the Project Period.

As for “preparation of an aquaculture plan,” an aquaculture model has already been studied and work is entering the verification test stage. The team gives high praise to the fact that, in some areas, Output has exceeded the Project framework. And a survey of legal systems pertaining to water-surface use is continuing and is expected to be completed by the end of the Project.

“Monitoring and reflection of evaluation results on aquaculture” are being conducted appropriately. The Joint Coordination Committee and other bodies are meeting regularly to conduct monitoring. Improvements that include increasing personnel and incorporating cage culture in Project activities have been made based on recommendations from the committee as well as a JICA advisory team (mid-term evaluation). Plans call for the Outputs achieved through the Project to be compiled into a technical manual for researchers by the end of the Project.

### (3) Project Purpose

The Project has successfully produced more than 100,000 juveniles (body weight: 1 gram) in its Kanagawa pejerrey seed production activities. Moreover, the Project has produced approximately 20,000 high-quality pejerrey seeds from its Junin stock. As for the aquaculture plan, possible models for aquaculture and propagation are being

studied, and verification tests of these proposed models have already started. Accordingly, the team has determined that one of the Project Purpose indicators has been achieved and that the remaining indicator should be achieved soon, and that, as a result, the Project Purpose will be achieved by the end of the Project Period.

### 3-2 Outline of evaluation results

#### (1) Relevance

Argentina has been seeking ways to diversify its economy and production, especially for small- and medium-scale farmers and livestock breeders by utilizing inland water bodies. It is thought that promotion of aquaculture and propagation that is the focus of the Project is a leading candidate for achieving this goal. It is also expected to create employment opportunities as well. Thus, the Project is in accordance with the policies (i.e., creation of new employment opportunities through introduction of new industries) and needs of the Argentine government and Buenos Aires provincial government. Furthermore, the municipality of Chascomús is preparing long-term strategies and has invited INTECH and EHC to serve as advisors in this process. It is expected that perspectives relevant to pejerrey aquaculture and propagation will be included in the strategy. On the other hand, the Project is consistent with the standpoints of “economic revitalization” and “regional development” that are part of JICA’s aid strategy for Argentina. And the team determined that support methods and approaches as well as selection of C/P organizations were appropriate because they did not have a major impact on Project activities.

#### (2) Effectiveness

The team found that Project progress is largely as scheduled and it highly expects that the Project will attain the Project Purpose within the Project Period. The team has given high marks to the fact that the Project has succeeded in producing more than 100,000 pejerrey seeds (body weight: 1 gram) in its Kanagawa stock and 20,000 in its Junin stock, and that some areas of the aquaculture plan have already reached the verification test stage. The team also recognizes that the educational level of the C/Ps and related organizations is one of the factors that have facilitated achievement of the Project Purpose.

#### (3) Efficiency

The inputs from the Japanese side were found to be largely appropriate in quality and quantity, being neither excessive nor insufficient; however, there were timing

difficulties due to slight delays in the transport of feed from Japan. Moreover, there were cases of insufficient communication between the experts and the C/Os. The inputs from the Argentine side were largely appropriate for the Project activities mentioned above, being neither excessive nor insufficient. However, an economic crisis and other factors affected the Project at its beginning, and thus the budgetary funding needed to build new aquaculture facilities could not be obtained. However, in all cases, these difficulties did not result in delays in Project activities. Strong ownership for the Project was found among the C/Ps and the related organizations, and it was understood that further budgetary measures are scheduled. Based on these findings, the team found the Project to have high efficiency.

#### (4) Impact

No negative impact has been found at present. Among the positive impacts is the establishment of a technical basis that can be widely applied to further technical development of aquaculture for other kinds of fish species, and cases in which technicians and equipment suppliers have been fostered in the field of aquaculture through involvement in establishing materials, equipment, and facilities for the Project. A network has been established among organizations engaging in related fields in Latin American countries through the hosting of an international seminar, and the number of requests to Argentina for technical support from neighboring countries is rising. Although there is concern about future potential environmental pollution caused by water wastes and fish diseases if a rapid increase in pejerrey production occurs, concerned organizations in Argentina are sufficiently aware of this danger and therefore it is expected that appropriate countermeasures will be taken. It should be noted that the team recognized that continuous technical development in the following five areas will be needed in order to achieve the Overall Goal as well as the Super Goal:

- 1) Production of suitable natural feeds and artificial compound feeds at lower cost
- 2) Improvement in the precision of the results of genetic comparison analysis between the Kanagawa pejerrey and Argentine indigenous pejerrey and their statistical handling
- 3) Implementation of further pathological studies
- 4) Comparative examination of the effectiveness in seed marking methods for stocking and study of the optimum one for produced seeds of pejerrey
- 5) Intensification and continued implementation of "cage culture" as part of technical and financial evaluation of proposed pejerrey aquaculture models.

## (5) Sustainability

The Project is receiving sufficient policy and administrative support from related governmental organizations, and this support can be expected to continue. Budget allocation and personnel assignments for pejerrey-related research and activities are showing increasing trends. Moreover, it is expected that pejerrey aquaculture and propagation will be considered in the long-term strategy being drawn up at the municipal level.

Financial and institutional sustainability was found to be sufficiently high. As mentioned above, an increasing trend is seen in budget allocation and personnel assignment, and establishment of facilities is moving forward. Furthermore, the cooperative relationship between INTECH and EHC is solid and can be expected to remain so into the future.

In terms of technical sustainability, the fact that the counterpart organizations possessed systems for improving and extending technologies even before the Project began is expected to lead to smooth diffusion of the Project Outputs. In addition, the techniques that were developed through the Project can be applied in not only Buenos Aires Province and Argentina, but also other regions and Latin American countries, and therefore technical diffusion and application can be expected. In terms of environmental sustainability, sufficient care is being paid to prevent water pollution, and such care will need to be maintained into the future. And, in terms of social and cultural aspects, the team determined that, although no special considerations were evident, there were no negative impacts on the Project's sustainability.

### 3-3 Factors contributing to emergence of effects

#### (1) Factors pertaining to planning content

- The dispatch of one short-term expert to Argentina prior to the Project's commencement and the training of Argentine C/Ps in Japan contributed significantly to the smooth launch of Project activities and later smooth implementation of these activities.

#### (2) Factors pertaining to the implementation process

The following contributed to the smooth promotion of Project activities:

- High educational level of the C/Ps
- Staff members of INTECH and EHC actively cooperated with the Project

- Basic infrastructure (electricity, communications, road access, waterworks, etc.) was available
- There were almost no problems purchasing and transporting necessary materials and equipment
- The Japanese and Argentine sides worked together in an atmosphere of friendship and mutual respect

#### 3-4 Problem areas and factors leading to problems

##### (1) Factors pertaining to plan content

- None in particular

##### (2) Factors pertaining to the implementation process

- At the initial stage of the Project, there were difficulties in communication between the Japanese experts and C/Ps that were caused by language and cultural barriers. However, these difficulties did not hinder Project progress, and both sides are currently enjoying sufficient communication.
- Worsening financial conditions in Argentina resulted in the Project's not being able to secure budgetary funding for construction of aquaculture facilities. This had some impact on the progress of Project activities.

#### 3-5 Conclusion

As was mentioned above, the Project was evaluated highly in each of the Five Evaluation Criteria, and it can be said that the entire project is progressing smoothly and according to plan. Despite being an undertaking with a relatively short period of three years, the Project continues to produce specific results, including the production of over 100,000 pejerrey seeds and preparation of an aquaculture plan. And the Project receives high recognition for the fact that it is enhancing incentive among concerned organizations and personnel to undertake pejerrey aquaculture and propagation activities. At the same time, the techniques developed through the Project have high general applicability, and this is resulting in neighboring countries' asking Argentina for technical assistance. Consequently, the Project's sustainability can be rated highly in terms of policy, financial/institutional, and technical aspects.

However, there are still many technical areas that should be improved in the actual implementation of aquaculture. Operation of pejerrey aquaculture and propagation, diversification of industry, and creation of employment are expected through active



application of Project Outputs and active support from concerned organizations as well as further technical improvement.

3-6 Recommendations (specific measures, proposals, and advice pertaining to the Project)

(1) Until the end of the cooperation period

Despite being a short undertaking of three years, the Project succeeded in achieving results through a variety of activities. Nonetheless, because Project activities have not been completed in a number of areas, the team recommended that concentrated efforts be made with regard to the following issues before the end of the Project Period:

- 1) Completion of genetic identification activities with the advice of a short-term expert to be dispatched in August 2005
- 2) Accumulation of various kinds of information on seed marking and preparation of a technical report on stocking.
- 3) Completion of documentation on the legal system for regional water surface utilization for pejerrey propagation (resource increment by stocking) with comparison to the Japanese legal system and based on cooperation obtained from C/Ps that received training in Japan.
- 4) Compilation of a manual for researchers and technicians that brings together technical knowledge on pejerrey aquaculture and propagation that was gained through Project activities, including seed production, genetic identification, feed development, disease prevention and treatment, and feasibility/profitability of aquaculture.

(2) After the end of the cooperation period

As was described above, the Project produced a variety of achievements that have various possibilities in development of aquaculture and propagation as a future industry. However, at the present time, engaging in it as an economically profitable business would be difficult. Thus, in order to tie the achievements of the Project to future development, the team recommended the following as issues that should be tackled following the end of the Project:

- 1) The current input level to the Project should be maintained with an eye to achievement of the Overall Goal and the Super Goal of the Project as well as to implementation of continued activities in cooperation and collaboration with other concerned organizations.
- 2) Extension activities aimed at farmers and livestock breeders (who are interested

in beginning aquaculture and propagation activities) should be implemented by simplifying the various Project achievements accumulated at INTECH and EHC as well as Japanese knowledge and specialized technologies.

- 3) The provincial government of Buenos Aires should start to examine the application of stocking activities by using seed produced by the Project, with consideration given to genetic differences among the strains, in order to propagate pejerrey resources.
- 4) Verification activities that are currently under way should be continued and enhanced in order to publish technical manuals for seed producers, aquaculture farmers, and concerned organizations.
- 5) Activities related to development of artificial feed to raise broodstock, countermeasures against fish diseases, genetic analysis, net cage culture, and seed marking for stocking that are currently under way should be continued and enhanced in order to achieve the Overall Goal as well as the Super Goal of the Project.
- 6) Taking techniques and know-how that were transferred through the Project, the government of Argentina should formulate strategies necessary for technical transfer to third countries, introduction into Argentina of other fish species for aquaculture, and establishment of a network for aquaculture research.
- 7) The provincial government of Argentina should arrange the issues that were identified through the Project in order to formulate and realize strategies for the further development of pejerrey aquaculture and propagation by stocking within the province.

3-7 Lessons learned (items drawn from the Project that will prove useful as references when identifying and formulating, implementing, and managing similar projects)

The fact that the C/Ps had a high educational level; that basic infrastructure such as electricity, communications, road access, and waterworks was available; and that there were almost no problems in purchasing and transporting necessary equipment, materials, and supplies allowed Project operation to proceed smoothly. Through the Project's implementation, the team confirmed in a first-person manner that possibilities exist for the Project to extract significant cooperation outputs even with little input.

Dispatch of a short-term expert to Argentina prior to the Project's commencement and participation by Argentine C/Ps in training in Japan contributed to the smooth design and launch of the Project. This plus the pro-Japanese environment in Argentine

society helped make later Project implementation easier.

In addition, it became clear through the Project that having organizations situated at different levels and having various dispositions participate in the same Project framework made it extremely difficult to establish clear demarcation among the organizations and to engage in collaboration and coordination. On the other hand, Argentina is a country in which national organizations (CONICET, INTECH) and provincial organizations (Ministry of Agricultural Affairs, Buenos Aires Province; EHC) do not ordinarily implement projects in cooperation with each other. Here, JICA served to “clamp” these organizations together, thereby realizing mutual collaboration within the Project that extended beyond organizational boundaries. This made a significant contribution to achievement of the Project Purpose.

#### 3-8 Follow-up situation

Plans call for the dispatch of two short-term experts (or an advisory team) to respond to technical issues that were identified in this final evaluation. As for a follow-up framework to be used after completion of the Project, it is hoped that some sort of small-scale project to replace the current Project will be implemented in order to continuously develop and apply the Outputs that were achieved through the Project. However, no decision on such a project has been made at the present time.