Menu List for the Creation of Training Programs

May 2017

Gifu Prefectural Inland Fisheries Training Center

【 Index 】

Title	1 Introduction to the Globally Important Agricultural Heritage Systems

[Training Overview]

The Nagara River and its pristine waters are conserved within the lives of the local people, and the ayu raised and nurtured in the river basin connect deeply to the regional economy, history and culture. The *Satokawa* System, a system which links the aquatic environment and fishery resources to the lives of the local people, was designated a Globally Important Agricultural Heritage System (GIAHS) on December 15, 2015, under the title "the Nagara River System."

(Lecture)

1 **Introduction to the Globally Important Agricultural Heritage Systems (GIAHS)**

- What is GIAHS?
- The criteria for designation and the status of designated sites
- The procedure for designation

2 **GIAHS "Ayu of the Nagara River System"**

- GIAHS "Ayu of the Nagara River System" and its Characteristics
- Initiatives for seeking recognition as GIAHS
- Action plan (regarding use and conservation)
  What is the action plan?
  Initiatives of the action plan

(Field Visit)

○ **Candidate Places for the Field Visit**

- Gujo City: *Mizubune*, the Nagara River Watershed Forest Conservation Project, live decoy fishing and *yana* fishing
  Gain knowledge of the local people's lifestyle which protects clear water, afforestation management by fishermen, and traditional fishing methods
- Mino City: (General Foundation) Gifu Prefectural Ayu Hatchery Center, the Sodai Irrigation Canal
  Initiative for the increase of ayu, the usage of clear water for agriculture
- Gifu City: Cormorant fishing and the Nagaragawa *Ukai* Museum
  Gain knowledge of cormorant fishing

[Instructors]

Staff members, the *Satokawa* Promotion Division / the Research Institute for Fisheries and Aquatic Environments

[Hand Out]

(Lecture) Resume and presentation data
(Field Visit) Brochure of the facility, photographs introducing activities, etc.

[Period]

One to two days

Title	2-(1) Conservation of the River's Clear Water

[Training Overview]

In this training we will learn about the significance of clear water and biodiversity, and various conservation initiatives which are carried out by the government and the local people together in consideration of the links between forests, rivers and the sea.

(Lecture)

1 **Significance of the Conservation of Clear Water**

- Importance of the clear water conservation
- Clean river preservation (legal system and efforts in Gifu Prefecture)
- The links between forests, rivers, and the sea

2 **Clear Water Conservation Initiatives Carried Out by Gifu Prefecture**

- Water pollution prevention, water quality monitoring, improvement of river water quality, and clean agriculture
- Unique lifestyle which protects pristine water as exemplified by *mizubune*, water culture
- Conservation and management of the *Satoyama* mountains, and of forests referred to as "green dams"
- Sewer management and water purification using septic tanks
- Chances for public to experience nature and study the environment
- River cleaning initiatives in cooperation with the government and the local people

(Field Visit)

○ **Candidate Places for the Field Visit**

- Man-planted forest, thinned forest and naturally-occurring forest (Broad-leaved forest, evergreen broadleaf forest, coniferous forest, coppice forest)
- Tokuyama Dam, Iwaya Dam, Yokoyama Dam
- Forest near the source of the water, Youth Forest
- Waterfalls, springs, watering holes, Amidaga Fall, Yoro Fall, Kagano Well, Tarui Spring and Osa reservoir
- Remains of places of worship, Nagataki-hakusan Shrine
- Tobu Waterworks Office (Yamanoue Water Purification Facility) and Gifu City Water Purification Facility
- Sewer management facility (Waterworks office of the river basin) and place of discharging water into the Nagara River
- Clear Water Renaissance and water purification facility (Sakai River and Kuwabara River)
- Gifu Prefectural Environment Management Technology Center (Septic tank)
- *Mizubune*, Igawa and Miyagase lanes (in Hachiman-cho, Gujo City)

[Instructors]

Staff members of the Forestry Policy Division, Department of Forestry Policy/ River Management Division, Department of Prefectural Land Management/ Sewer Development Division, Department of Urban Development/ Environmental Management Division, Department of Environmental Affairs and Citizen Support/Research Institute for Fisheries and Aquatic Environments

[Hand Out]

(Lecture) Resume and presentation data

(Field Visit) Brochure of the facility, photographs introducing activities, etc.

[Period]

One to four days

Title	2-(2) Significance of the Conservation of Biodiversity

[Training Overview]

Approximately 80% of the area of Gifu Prefecture is covered with forests. These forests are intertwined with the local people's livelihoods via areas such as agriculture, forestry, and livestock, as well as with the day to day life of people and other organisms with regard to eating, dwelling, and simply relaxing.

We must continue striving to conserve not only rare species, but also every creature around us. To do so, we must aim to reconstruct the relationship between humans' and other organisms' lives, as well as maintain the natural environment in order to ensure a sustainable livelihood for all.

(Lecture)

1 **Introduction to Biodiversity**
Significance of biodiversity and related conservation measures

2 **Improvement of the Habitats of Aquatic Organisms**
Objectives of cooperative initiatives to construct water channels for aquatic organisms and their structure, etc.

3 **Conservation of Rare Fish Species**
Significance of rare fish species and examples of such species (Dwarf topmouth minnow, deepbody bitterling, smallhead stickleback, etc.)

(Field Visit)

○ **Candidate Places for the Field Visit**

- Waterways which have diverse fish fauna (springs, floodplains, dry riverbeds and alluvial fans)
- Waters which alien species inhabit (Large mouse bass, rose bitterling, apple snail, red-eared slider turtle and nutria, etc.)
- Type locality of water channels connected with rice fields, drainages and rivers.
- Step construction in sluices and earthen canals (Kurihara area)
- Rice paddy fishways, automatic fish counting apparatus installation (Gifu Agriculture and Forestry High School, Ario area)
- Water channel cooperation initiative model area (Sembiki area, Seki City and Ima area, Kani City)
- Deepbody bitterling conservation pond, organism displays for the promotion of public awareness (Hashima City Library)
- Protected areas for the smallhead stickleback (Tsuya Riv., Sone and Hachiman ponds)
- Restored areas which dwarf topmouth minnows inhabit (Akadani Pond and Hiraso Pond)
- Plecoptera observation (Nagara riverbank)
- World Freshwater Aquarium and Water Eco Park (Kiso River Park)

[Instructors]

Staff members of the Research Institute and the Natural Environment Conservation Division

[Hand Out]

(Lecture) Resume and presentation data
(Field Visit) Brochure of the facility, photographs introducing activities, etc.

[Period]

One to four days

Title	3-(1) General Introduction to the Increase of Fishery Resources (1)

[Training Overview]

Inland water provides a smaller habitat than marine areas for aquatic organisms; thus, overfishing could easily lead to the exhaustion of fishery resources. Therefore, we need to supplement natural resources through direct and indirect means such as the stocking of fish for the purpose of fishing, the maintenance of artificial spawning grounds, and fishing regulations. However, actions taken to increase fishery resources need to consider their impact on natural resources, ecology, and their accordance with fishing regulations.

(Lecture)

1 **The Ways to Increase Fishery Resources in Inland Fisheries**

- Increasing and managing fishery resources (Definitions, categories, etc.)
- Techniques for increasing resources (Release of fry, artificial fertilization and release of juvenile fish, construction of spawning grounds, etc.)

2 **Ecosystem Conservation and Restoration**

Restoration and regeneration of natural ecosystems

Case studies concerning the improvement of continuity, diversity and stability of habitats (e.g., methods of constructing natural symbiosis, construction of spawning grounds, etc.)

3 **Genetic Effects of the Release of Fry**

- Significance of the conservation of genetic diversity
- Effects of the release of fry on the ecosystem

Decrease of the number of ayu swimming upstream early through via the release of ayu fry from Biwa lake, decrease of the number of red spotted masu trout (sea-run variety) through the release of domesticated fry

4 **Production of Genetically Consistent Fry for Releasing**

Use of native population, preservation of capable spawner fish, etc.

(Field Visit)

○ **Candidate Places for the Field Visit**

- Mino City: Ayu Hatchery (Fry produced for release from wild spawner fish)
- Hida City: Artificial spawning riverbed for mountain stream fish (Supporting wild fish breeding)

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume and presentation data

(Field Visit) Brochure of the facility, photographs introducing activities, etc.

[Period]

One to two days

Title	3-(2) Fishery Resource Management System with Ayu as Illustrative Example

[Training Overview]

Inland fisheries enhance people's lives by providing aquatic products necessary for regional culinary culture, as well as facilitating various experiences such as recreational fishing and chances to interact directly with nature. However, fishery resources including ayu and eel could be easily depleted by overfishing and environmental deterioration. Therefore fishery regulations such as the Fishery Act and the Act on the Protection of Fishery Resources are put in place in order to ensure the sustainable use of fishery resources.

(Lecture)

1 【Fishery Regulation】

（1） Legal systems concerning inland fisheries

・Fishery regulation and the Act on the Protection of Fishery Resources
Regulation regarding fishery rights, fishery management, regulation of inland fisheries and the Act on the Protection of Fishery Resources

・Gifu Prefectural Fishery Management Regulations
Cultivation of conservation regulations of prefectural fishery resources, fishery management, regulations for establishing order in the fishing industry

・Regulations made by fishery cooperatives (Regulations on the use of fishing rights and on recreational fishing)
Regulations regarding commercial and recreational fishing by fishery cooperatives which supervise fishing grounds

（2） Regulations on Fishing Rights

・Fishery cooperatives and fishery cooperative association

・Fishing license (establishment of Fishing Rights※1) and the act of increasing resources※2

・Individuals who fish (recreational fishing) excluding cooperative members (fishermen)

・The status of ayu fishing in Gifu Pref. under Fishing Regulations

2 【Fishery Resource Management System】

・Overview of the Gifu Prefectural Inland Fisheries Commission (Objectives, organizational make-up, initiatives, etc.)

・Role of the Gifu Prefectural Inland Fisheries Commission (Interrelation between Gifu Pref. Government and fishery cooperatives, etc.)

(Field Visit)

○ Candidate Places for the Field Visit

・Fishery cooperatives: Understanding the work of cooperatives

・Inland fishing locations: Understanding the status of recreational fishing, non-fishing areas, etc.

(Practical training)

・Fisheries experience (angling ayu by live decoy, net fishing, etc.).

[Instructors]

Staff members of the Satokawa Promotion Division/Research Institute

[Hand Out]

(Lecture) Resume and presentation data

(Field Visit) Fishery Act and Fishery Coordination Regulation and Regulation of Recreational Fishing and Fishery Rights

[Period]

One to four days

※1 Fishing Rights give the holder the exclusive right to conduct commercial fishing.

※2 The act of increasing resources refers to releasing fry as well as constructing spawning grounds in order to proactively increase aquatic resources.

Title	4 Tourism and Branding

[Training Overview]

In Gifu Prefecture, ayu fishing is practiced with various methods and fishing tools which take advantage of ayus' behavior. Some traditional fishing techniques such as cormorant fishing and *yana* fishing are performed as a tourist attraction in the region. Ayu live decoy fishing is one of the most popular attractions, and around 170,000 fishermen enjoy taking part in such fishing annually in Gifu. Half of these fishermen are from other prefectures; thus, ayu fishing contributes considerably to enhancing the economy in the region. In addition, ayu caught in the upper reach of the Nagara River were registered as a Regional Collective Trademark (Gujo Ayu※) and as such are sold at a high price due to their high level of public recognition.

○ **Candidate Places for Field Visit**

・Cormorant fishing (May 11 – October 15)
  Nagara cormorant fishing (Gifu City), Oze cormorant fishing (Seki City)
・Yana fishing (August 15 – October 15)
  The Nagara River (from Hachiman-cho to Minami-cho in Gujo City), the Itadori River (Horado, Seki City), etc.
・Live decoy fishing (Early June – late August)
  Hachiman-cho, Gujo City, etc.
・Ayu cargo market (Gujo Fisheries Cooperatives: early June –l ate August)
・Nagara River Cormorant Museum
・Nagara River Ayu Park

[Instructor]

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[Hand Out]

(Field Visit) Brochures, photographs, etc.

[Period]

One to two days

※ : Branded ayu which are caught by live decoy fishing in the fishing areas where are managed by the Gujo Fisheries Cooperatives and are shipped to the cargo market which the cooperatives operate. It became the very first river fish to be registered as a Regional Collective Trademark by the Japan Patent Office in 2007.

Title	5-(1)-① Techniques for Increasing Fishery Resources ～ Ayu ～

[Training Overview]

Ayu, also known as sweetfish, is the most important fishery resource in Gifu; thus, various methods for increasing resources are practiced in combination in order to assure their sustainable use. These methods include the release of fry, conservation of spawner fish, construction of spawning grounds and artificial fertilization followed by release. The Gifu Pref. Government has taken the initiative of creating a handbook on fry release management, in accordance with the number of ayu swimming upstream and the period of upstream swimming activity, as well as conducting research targeting ayu which swim upstream early, in order to preserve resources for future generations.

(Lecture)

1 **Information on Ayu**

Life cycle, distribution, ecology, etc.

2 **The Status of Efforts to Increase Ayu Resources**

・Effects of increasing resources (Types of fry released, differences in effectiveness depending on period of release, etc.)

・Constructing spawning grounds (Conserving resources for future generations), establishing areas of artificial fertilization and release, as well as non-fishing areas

3 **Initiatives Carried Out by Gifu Prefectural Government**

・Development and dissemination of techniques for the release of fry in accordance with the number of ayu swimming upstream and the period of upstream swimming activity

・Preservation resources for of future generations in order to preserve ayu which swim upstream early

Research on the optimal construction period and locations of spawning grounds

・Disease prevention of ayu in the river

Prevention against bacterial cold water disease※1 and Edwardsiella-ictaluri disease※2

(Field Visit)

○ **Candidate Places for Field Visit**

・Kuwana City, Mie Pref.: Artificial river near the estuary weir of the Nagara River (Late October) (Case study of ayu resource conservation)

・Mino City: (General Foundation) Gifu Prefectural Ayu Hatchery (Ayu fry production and ayu fishing methods)

・Gujo City: The Nagara River (Ayu fishing spots, yana weir fishing, ayu fishing techniques and their practice)

・Gifu City: The Nagara River (Cormorant fishing, shoal net fishing, ayu spawning areas, traditional ayu fishing and ayu conservation)

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume and presentation data

(Field Visit) Brochure of the facility, photographs, etc.

[Period]

One to three days

※1 : An ayu illness caused by *flavobacterium psychrophilium*. After it was first detected in Japan in 1987, it has been the most harmful disease to ayu in breeding grounds and rivers nationwide. It is most likely to develop in water temperatures around 18℃, and subsides in the high water temperatures of summertime. *F.psychrophilum* is known as the pathogen of bacterial cold water disease among coho salmon and the like, but the pathogen of ayus' bacterial cold water disease is a different genotype.

※2 : An ayu illness caused by *Edwardsiella ictaluri.* It was first detected in Japan in 2007. After that, the pathogen was discovered to have spread widely throughout Japan's rivers. The bacteria is known as the pathogen responsible for enteric septicemia in catfish in North America and Southeast Asia. There have been no reports of it having a serious impact within Japan on fish other than ayu, but many types of fish, such as catfish, eels, and freshwater minnows are confirmed carriers of the disease. Thus, even in seasons when ayu are not present, there is concern that the bacteria may have a residual presence in rivers. It causes outbreaks in waters of 20℃ and higher.

Title	5-(1)-② Techniques for Increasing Fishery Resources ～ Salmonidae ～

[Training Overview]

Salmonidae (red-spotted masu trout, masu trout and char) is registered as a fish species which falls under the jurisdiction of fishing rights by 28 (out of a total of 33) fishery cooperatives in Gifu Prefecture; it is a particularly important species for inland fishing. In order to sustain these resources, more complicated and advanced techniques, beyond just the release of fry, are being developing; these techniques include methods of constructing spawning grounds and resource management methods. In this training, we will conduct on-location training, introduce relevant case studies, and learn the methods, instruments, and materials used in resource management, the releasing of fry, and the construction of spawning grounds. This training will aid in the implementing the sustainable use of Salmonidae, and in improving the cost effectiveness of fishery cooperatives' management of fishing sites.

(Lecture)

1 **Information on Red-spotted Masu Trout, Masu Trout and Char**

- Distribution, life cycle, ecology, etc.
- Distribution of native population, significance and use of conservation (Contributing to the production of semi-wild ayu)
- Characteristics and utility of fish types used for release

2 **Methods for increasing Fry**

- Release of fry (fry, fertilized eggs, spawner and adult fish)
  Methods, instruments, materials, pros and cons, cost-effectiveness, etc.
- Construction of spawning grounds
  Methods, instruments, materials, pros and cons, cost-effectiveness, etc.
- Resource management methods (non-fishing areas, restrictions on fish size for fishing, etc.)
  Methods, case studies, etc.
- Fishing site management
  Criteria of resource management method, zoning management, etc.

(Training)

○ **Candidate Place for Training**

Rivers in Gifu Prefecture

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume, presentation data and handbook
(Training) Rivers in Gifu Prefecture

[Period]

One to two days

Title	5-(1)-③ Techniques for Increasing Fishery Resources～Carp and Crucian Carp～

[Training Overview]

Carp and crucian carp are mainly distributed in the flat plains in Gifu Prefecture; for this reason, they are popular targets for recreational fishing on rivers, reservoirs, and fishing ponds. These resources are largely sustained by the release of fry; however, some fishing sites are maintained through the use of floating spawning beds and wooden pile construction. The release and movement of fry has been limited for koi carp since the outbreak of Koi herpes virus disease (KHVD), in order to prevent the spread of the illness.

(Lecture)

1 **Carp and Crucian Carp**

- Distribution, life cycle, ecology, etc.
- Use (Traditional fishing, recreational fishing, traditional cuisine, etc.)
- Recent status of fishing sites (Impact of KHVD, etc.)

2 **Increasing Carp and Crucian Carp Populations**

- Release of fry (Status of releasing fry in inland fisheries in Gifu)
- Construction of spawning grounds (Case studies such as: construction of floating spawning beds, wooden pile construction, riverine lagoons, etc.)

(Field Visit)

○ **Candidate Places for Field Visit**

- Ogaki City: fishing zone construction on the river (floating spawning beds, wooden pile construction and riverine lagoons)
- Mizuho City: fishing zone construction on the river (floating spawning beds, wooden pile construction)
- Kaizu City: Kaizu Fisheries Cooperative (Traditional fishing methods)

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume and presentation data
(Field visit) overview brochure of the facilities, photographs etc.

[Period]

One to two days

Title	5-(2)-① Aquaculture Techniques ～ Ayu ～

[Training Overview]

Ayu is the fish with the largest yield in Gifu Prefecture, and its aquaculture industry is thriving in the plains. In addition, ayu are deeply connected to the local culture and play a significant role in regional traditional cuisine.

In this training, we will explain in detail the aquaculture techniques regarding the selection of spawner ayu, collection of eggs, development of spawner fish, as well as details of compound feed and other such aquaculture materials.

(Lecture)

1 **Ayu**

Life cycle, distribution and ecology

2 **Status and Challenges of Ayu Aquaculture in Gifu Prefecture**

- The position and significance of ayu within Gifu
- High value-added ayu produced in Gifu through the technique of sex manipulation (feminization)
- Fish diseases such as bacterial cold water disease and their prevention

3 **Ayu Aquaculture Techniques**

- Techniques for egg collection and fertilization using artificial seminal plasma
- Characteristics and cultivation methods of natural feed (Brachionus plicatilis and brine shrimp)
- Characteristics of compound feed (Ingredients, dosage and feeding method)
- Development of bacterial cold water disease-resistant fish cultures

(Field Visit)

○ **Candidate Places for Field Visit**

- Kakamigahara City: The Research Institute for Fishery and Aquatic Environments (Ayu aquaculture initiatives)
- Mino City: Ayu Hatchery (Production of ayu fry for release)
- Gifu City: The Nagara River (Ayu fishing locations)

(Practical training)

- Producing testicular milt from sex-reversed masculinized female ayu
- Culture of initial biological feed
- From maturity identification to egg collection and fertilization

[Instructors]

Staff members of the Satokawa Promotion Division / the Research Institute

[Hand Out]

(Lecture) Resume and presentation data

(Field Visit) overview brochure of the facilities, photographs, etc.

[Period]

One to four days

Title	5-(2)-② Aquaculture Techniques ～ Salmonidae ～

［Training Overview］

Salmonidae aquaculture (including fish such as red-spotted masu trout, masu trout and char) is carried out using the bountiful water and cool climate of Gifu Prefecture's mountainous areas. Salmonidae aquaculture farmers tend to operate on a small scale. Some aquaculture farmers produce fish not only for human consumption, but also for releasing (i.e., resource increasing) by fishery cooperatives. Gifu Prefectural Government makes efforts to develop the type of fish which meet the needs of aquacultural farmers, providing eggs as well as teaching techniques for breeding.

(Lecture)

1 **Salmonidae Produced in Gifu Prefecture (Red-spotted masu trout, masu trout and char)**

Life cycle, distribution, ecology, etc.

2 **Salmonidae Aquaculture**

- Status and challenges for Salmonidae aquaculture in Gifu Prefecture
- Aquaculture techniques for producing Salmonidae
- Development and provision of high quality fish for aquacultural use (Selective breeding and chromosome ploidy)
- Salmonidae diseases

(Training)

○ **Salmonidae Breeding Management**

- Process from egg collection to fertilization and egg management
- Breeding management from hatching to juvenile stage
- Breeding management from juvenile stage to adulthood
- Breeding management from adulthood to egg collection
- Production of triploid fish

[Instructors]

Staff members of the Research Institute

［Hand Out］

Resume and presentation data

［Period］

One to four days

Title	5-(2)-③ Aquaculture Techniques ～ Carp and Crucian Carp ～

[Training Overview]

Carp and crucian carp are the main fish which are produced on inland fisheries, and it has been farmed via aquaculture from early in Japan's history. In addition, it deeply connect to the local culture and plays an important role in local traditional cuisine.

In this training session, we will examine in detail the aquaculture methods for producing carp and crucian carp, as well as materials related to its production.

(Lecture)

1 **Carp and Crucian Carp**

・Distribution, life cycle, ecology, etc.
・Use (Traditional fishing methods, recreational fishing, local cuisine, etc.)
・Current status of fishing sites (Impact of KHVD, etc.)

2 **Carp and Crucian Carp Aquaculture**

(1) Egg Collection
・ Natural oviposition (Optimal environment for oviposition, e.g. ideal water temperature, etc.)
・Artificial egg collection (Tasks involved in collecting eggs, etc.)
・Egg management (Egg characteristics and implantation materials such as synthetic fiber)

(2) Rearing fertilized fry
・Characteristics of fertilized fry (Shape, form, etc.)
・ Feed for early developmental period (Characteristics water fleas and methods of water flea cultivation)
・Management of water used for rearing (Water temperature, salinity, etc.)

Rearing spawner fish
・Aquaculture methods (Extensive aquaculture, fertilized aquaculture, intensive aquaculture)
・Compound feed (Ingredients, dosage and feeding method)
・Prevention of serious fish diseases such as KHVD

Shipment and use of carp and crucian carp produced via aquaculture
Shipping conditions of produce (freshness, etc.), processing, cooking, etc.

(Field Visit)

○ **Candidate Places for Field Visit**

・Kakamigahara City: Research Institute for Fisheries and Aquatic Environments (Prevention of fish disease, conservation initiatives for rare cyprinid fish)
・ Kakamigahara City: World Freshwater Aquarium (Rearing method and conservation initiatives for rare cyprinid fish)

[Instructors]

Staff members of the Satokawa Promotion Division / the Research Institute

[Hand Out]

(Lecture) Resume and presentation data
(Field visit) Overview brochure of the facilities, photographs, etc.

[Period]

One to two days

Title	5-(2)-④ Aquaculture Techniques ～ Catfish ～

[Training Overview]

In Gifu Prefecture, ayu and masu trout are thriving, both on the market and in aquaculture, since the techniques for their production are well established. However, other fish such as ajime loach and rhinogobius of the mountainous areas and gudgeon of the plains, despite having been traditionally used as food, are not distributed on the market. Research has been conducted to develop efficient methods of aquacultural production, as well as ways to increase resources, with the aim of being able to produce these fish used in traditional food as a local specialty item of the limited regions in which they are found.

The institute has developed and disseminated aquaculture techniques for producing catfish in the plains (warm water regions), as its good growth and flavor make it a promising candidate for production as a local specialty item.

(Lecture)

1 **Catfish**

Catfish which inhabit Japan; target species for aquaculture

2 **Pros and Cons of Catfish (*Silurus asotus*) Aquaculture**

- Development (Able to grow from 500g to 1kg in six months with proper water temperature management)
- Survival (Cannibalism problem during the juvenile stage)
- Taste (Superiority of cultured fish)

3 **Methods for Catfish Aquaculture**

- Collection and management of eggs (Promotion of artificial ovulation)
- From larval stage to juvenile stage (Cannibalism prevention)
- From juvenile stage to adulthood (Efficient rearing method)

(Field Visit)

○ **Candidate Places for Field Visit**

Nakatsugawa City and Mino City: Private aquaculture farms (Aquaculture methods adapted to the facilities and environment)

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume and presentation data

[Period]

One to two days

Title	5-(2)-⑤ Aquaculture Techniques ～ Sculpin ～

[Training Overview]

In Gifu Prefecture, ayu and masu trout are thriving, both on the market and in aquaculture, since the techniques for their production are well established. However, other fish such as ajime loach and rhinogobius of the mountainous areas and gudgeon of the plains, despite having been traditionally used as food, are not distributed on the market. Research has been conducted to develop efficient methods of aquacultural production, as well as ways to increase resources, with the aim of being able to produce these fish used in traditional food as a local specialty item of the limited regions in which they are found.

The institute has developed and disseminated aquaculture techniques for producing sculpin in the mountains, as its rarity and flavor make it a promising candidate for production as a local specialty item.

(Lecture)

1 **Sculpin**

Taxonomic position of sculpin, distribution and target species for aquaculture

2 **Aims and Purposes of Sculpin Aquaculture**

- Production as a local aquatic specialty (Leveraging the concept of clear water and rarity)
- Local production for local consumption (Small scale limited products produced and sold by the same individuals; prioritizing the attraction of customers over external shipping)
- Full-life cycle aquaculture (Decreasing risks to fry security)

3 **Sculpin Aquaculture Methods**

- Collection and management of eggs
- From the juvenile stage to the fry stage (Recycled seawater rearing, conversion of feed from biological feed to compound feed)
- From the fry stage to adulthood (High density rearing)

4 **Maintenance of the Sculpin Aquaculture Facilities**

- The meaning of small scale aquaculture
- Making an aquaculture apparatus by oneself

(Field Visit)

○ **Candidate Places for Field Visit**

- Gero City: The Research Institute for Fisheries and Aquatic Environment, Gero Branch (Sculpin aquaculture overview)
- Mino City: Private aquaculture farms (Improvement of facilities by adapting to conditions)

[Instructors]

Staff members of the Research Institute

[Hand Out]

(Lecture) Resume and presentation data
(Field visit) facility brochure, sculpin shop brochure

[Period]

One to two days

Title	5-(2)-⑥ Aquaculture Techniques ～ Fish disease diagnosis ～

[**Training Overview**]

The occurrence of fish diseases is a very serious problem in aquaculture business which breed intensively fishery animals such as fish. In some cases, some diseases occur in natural environments such as rivers, which can cause significant damage to fishery resources. In order to alleviate the damage from these fish diseases, it is necessary to identify and deal with the cause quickly by diagnosis. This program exercises the necessary anatomy and the various inspection methods in the diagnosis of fish diseases.

（Practical training）

1 Methods for the Diagnosis of Fish Diseases
- Anatomy of Fish
- Optometric observation of tissues（raw samples・Diff-Quik stain）

2 PCR method ※Use of samples of cold water disease,etc.
- DNA extraction from tissues (gill or kidney)
- PCR
- Electrophoresis and gel staining

3 RT- PCR method ※Use of IHN sample
- RNA extraction from tissues (kidney)
- RT-PCR
- Electrophoresis and gel staining

[Instructor]

Staff of the Gifu Prefectural Research Institute for Fisheries and Aquatic Environments

[Hand Out]

（Practical training）Outline、Protocol of DNA extraction、Protocol of RNA extraction、PCR Protocol、RT-PCR Protocol

[Period]

one to four days