

# Relation between Golden venus chub population dynamics and environmental factor in irrigation ponds of the southeast Hyogo prefecture

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## 1.INTRODUCTION

In Hyogo prefecture , many irrigation ponds are made at near area of the Inland Sea , where rain is little ,and the number of pond is the most in Japan.

Once ,irrigation ponds were used for agriculture and meeting place ,where good ecosystem were formed by traditional management . However ,in present , necessity of irrigation ponds is lower , connection with community is less , and environment of irrigation ponds change greatly .

Golden venus chub ,freshwater fish native to Japan ,live in shallow irrigation pond and channel at plain and hill , at near area of the Inland Sea . However , the number of habitat is decreased , this species is appointed endangered species IB in red data book of the Environment Ministry , and become a high-risk kind of extinction in the near future . It cannot be said that detailed knowledge about life cycle ,environmental factor and population dynamics that are necessary for conservation activity are enough . In this study , I investigated relation between population dynamics of Golden venus chub which inhabited in irrigation ponds of the southeast Hyogo prefecture and environmental factor , and aimed to quantify inhabitable environment and to get knowledge to contribute to conservation activity .

## 2.METHODS

I investigated in six irrigation ponds with different environmental condition in the southeast Hyogo prefecture in 2009 from 2001.I performed population investigation of Golden venus chub by marking-and-recapture method. I set five trap (25 × 25 × 45 cm) which set bait in each pond and collected fish 30 minutes later. I measured length of captured fish , and marked fish by fin cut and released fish into the original pond . I collected fish the next day and measured length and recorded having mark or not and released into the original pond . With these data , I calculated the presumed population of Golden venus chub of each pond by Petersen method . In addition , I investigated aquatic plant and aquatic animal , and measured water quality ( dissolved oxygen , water temperature , pH , electric conductivity , chemical oxygen demand ) .

I examined correlation between average length and population density to study the population dynamics of Golden venus chub in each pond . In addition , based on presumed population , I defined increase rate as follows . Increase rate = (t+1) year population / t year population . Based on this increase rate , I classified ponds in two groups ( increase rate < 0.7 , 1.5 < increase rate ) . Between these two groups , I compared water quality measured in each time with Mann-Whitney U test , in April when I performed population investigation , in from May to July of the breeding season , and in August of the summer .

## 3.RESULTS AND DISCUSSION

In 2007 , average length of A pond and C pond was small , reflected length of population of 1 year old fish . In addition , there were few populations of D pond , but ratio that big individual of length occupied was high as a remarkable characteristic .

When population density of Golden venus chub rose , average length became small .When increase rate was high , April COD and August COD were significantly low together (Mann-Whitney U test ,p<0.05) . In addition , then April EC and maximum EC from May to July were significantly high together (Mann-Whitney U test ,p<0.05). When COD that was index of underwater organic amount was low , EC that was index of inorganic ion amount was high , the tendency that increase rate of Golden venus chub was high was found . In the pond which was not watched of aquatic plant, the tendency that populations decreased was looked at . Populations were easy to increase rapidly by drying pond and introducing fish .It was suggested that drying pond , introducing fish and existence of aquatic plant were necessary for conservation .