Journal of Marine Science and Technology

Volume 21
Issue 7 *Vol 22, Supplemental*

Article 42

THE CHECKLIST OF INLAND-WATER AND MANGROVE FISH FAUNA OF KINMEN ISLAND, FUJIAN PROVINCE, TAIWAN WITH COMMENTS ON ECOLOGICAL CONSERVATION OF NATIVE FISHES

I-Shiung Chen
Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, R.O.C., isc@ntou.edu.tw

Chia-Jun Weng
Forestry Bureau, Agriculture Council, Executive Yuan, Taipei City, Taiwan, R.O.C.

Yi-Ru Chen
Forestry Bureau, Agriculture Council, Executive Yuan, Taipei City, Taiwan, R.O.C.

Shih-Pin Huang
Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, R.O.C.

Zong-Han Wen
Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, R.O.C.

See next page for additional authors

Recommended Citation

Chen, I-Shiung; Weng, Chia-Jun; Chen, Yi-Ru; Huang, Shih-Pin; Wen, Zong-Han; Jang-Liaw, Nian-Hong; and Tsai, Tsung-Hsien (2013) "THE CHECKLIST OF INLAND-WATER AND MANGROVE FISH FAUNA OF KINMEN ISLAND, FUJIAN PROVINCE, TAIWAN WITH COMMENTS ON ECOLOGICAL CONSERVATION OF NATIVE FISHES," *Journal of Marine Science and Technology*: Vol. 21: Iss. 7, Article 42.
DOI: 10.6119/JMST-013-1226-1
Available at: https://jmstt.ntou.edu.tw/journal/vol21/iss7/42

THE CHECKLIST OF INLAND-WATER AND MANGROVE FISH FAUNA OF KINMEN ISLAND, FUJIAN PROVINCE, TAIWAN WITH COMMENTS ON ECOLOGICAL CONSERVATION OF NATIVE FISHES

Authors

I-Shiung Chen, Chia-Jun Weng, Yi-Ru Chen, Shih-Pin Huang, Zong-Han Wen, Nian-Hong Jang-Liaw, and Tsung-Hsien Tsai

Journal of Marine Science and Technology, Vol. 21, Suppl., pp. 316-319 (2013)
DOI: 10.6119/JMST-013-1226-1

THE CHECKLIST OF INLAND-WATER AND MANGROVE FISH FAUNA OF KINMEN ISLAND, FUJIAN PROVINCE, TAIWAN WITH COMMENTS ON ECOLOGICAL CONSERVATION OF NATIVE FISHES

I-Shiung Chen[1], Chia-Jun Weng[2], Yi-Ru Chen[2], Shih-Pin Huang[1], Zong-Han Wen[1], Nian-Hong Jang-Liaw[1], and Tsung-Hsien Tsai[1]

Key words: fish fauna, new record, endangered species, fish conservation.

ABSTRACT

The ecological status of the lowland freshwater and brackish fish fauna traditionally got better protected since long time for military protect region without great human and agriculture impact in last few decades. However, many human reconstruction of river habitats, pollution and overuse of irrigation from river water have become great impact for fish survival in Kinmen. So far, there are totally 27 families, 57 genera and 68 species have been collected and recorded by our intensive survey for those freshwater habitats in inlandwater of Kinmen island, Fujian Province, Taiwan in our recent field survey during 2011-2012. Totally 17 newly recorded native species were found in recent our recent survey. The most speciose group would the gobies belonging to Family Gobiidae. The most dominant population in native freshwater fishes seems to be *Pseudorasbora parva*. Among them, there are 2 families at least 3 invasive species which seem to be dominant for their aquatic environment. The dominance of invasive fishes have become very great threat for local very endangered species, *Metzia mesembrinum*. It needs to immediately announce the serious impact for extinct local population of both native fish species: *Puntius synderi* and *Cobitis* sp. have been happened in recent year.

Paper submitted 10/30/13; revised 12/12/13; accepted 12/26/13. Author for correspondence: I-Shiung Chen (e-mail: isc@ntou.edu.tw).
[1] Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, R.O.C.
[2] Forestry Bureau, Agriculture Council, Executive Yuan, Taipei City, Taiwan, R.O.C.

I. INTRODUCTION

The Kinmen island is located in the river mouth opening of Julongjiang River basin of Fujian Province, the territory belonging to Taiwan, ROC. In the earlier stage of 1960, the fauna of inlandwater fishes has been formally reported by Cheng TR [5] and he firstly mentioned about the occurrence of *Rasborinus takakii* (Oshima) [7] which found from Kinmen waters. However, *Rasborinus takakii* (Oshima) has been regarded as a junior synonym of *Metzia mesembrinum* (Jordan & Evermann) [6].

In this island, the ecological status of the lowland freshwater and brackish fish fauna traditionally got better protected since long time for military protect region without great human and agriculture impact in last few decades. Therefore, they faced the problem for invasive species of many cichlids for threatening their habitats. However, in recent 10 years, many human's reconstruction of the dams and river banks at river habitats, water pollution and over-use by the agriculture's irrigation from river water have become another great impact for the survival of inlandwater fishes in Kinmen Island. The great damage for fish fauna should be more concerned after great engineering work done for artificial river bank and many small dams to block and fragmented the real habitats for native inlandwater fishes [4].

Since the establishment of the National Park in early 2000, the wildlife survey for freshwater fish fauna were conducted by the conservation planning in their own wildlife resources inventory especially for starting survey of freshwater fishes. Chen's team have published a fish guide book for local inlandwater fish fauna in 2001. The basal fish fauna have been established more detailed especially they included the fishes collected from brackish waters around river mouth [4].

The aim of this paper would document our recent intensive survey mainly done in recent 2 years for realizing more comprehensive fish fauna information as well as to comments on

Table 1. The checklist of inlandwater and mangrove fish fauna from Kinmen Island, Fujian Province, Taiwan.

Family	Species name	Cheng (1960)	Chen *et al*. (2002)	Current studies freshwater	brackish	mangrove	Status
Elopidae	*Elops machnata*		V				
Anguillidae	*Anguilla japonica*	V	V		V	V	
	Muraenesox bagio				V		
Clupeidae	*Konosirus punctatus*		V				
	Sardinella lemuru				V		
Cyprinidae	*Carassius auratus auratus*	V	V	V			
	Cyprinus carpio	V	V				
	Metzia mesembrinum	V	V	V			EN
	Pseudorasbora parva		V	V			
	Puntius snyderi	V	V				EX
Cobitidae	*Cobitis* sp.	V					EX
	Misgurnus anguillicaudatus	V	V				
	Liza affinis		V	V	V		
Mugilidae	*Liza haematocheilus*		V				
	Liza macrolepis		V	V	V		
	Liza subviridis		V				
	Mugil cephalus		V	V	V		
Poeciliidae	*Gambusia affinis*	V	V	V	V		INV
Syngnathidae	*Parasyngnathus pencillus*		V				
Synbranchidae	*Monopterus albus*	V	V	V			
Ambassidae	*Ambassis urotaenia*		V		V		
Percichthyidae	*Lateolabrax japonicus*	V	V		V		
Leiognathidae	*Leiognathus nuchalis*		V				
	Lutjanus argentimaculatus		V		V		
Lutjanidae	*Lutjanus russelli*		V				
Gerreidae	*Gerres erythrourus*		V	V			
Sparidae	*Acanthopagrus latus*		V				
	Acanthopagrus schlegelii				V		
Terapontidae	*Pelates quadrilineatus*				V		
	Terapon jarbua		V		V		
Cichlidae	*Oreochromis niloticus*			V			INV
	Oreochromis spp.		V	V			INV
	Tilapia zillii			V			INV
Labridae	*Halichoeres dussumieri*		V				
Blenniidae	*Omobranchus punctatus*		V				
	Praealticus striatus		V				
Eleotridae	*Bostrychus sinensis*				V		
	Butis koilomatodon		V				
	Butis melanostigma		V		V		
	Eleotris oxycephala		V		V		
Gobiidae	*Acanthogobius ommaturus*		V	V	V		
	Acentrogobius viridipunctatus		V		V		
	Amoya brevirostris				V		
	Apocryptodon punctatus				V		
	Boleophthalmus pectinirostris				V	V	
	Glossogobius olivaceus		V		V		
	Hemigobius crassa					V	
	Lociogobius sp.				V	V	
	Mugilogobius abei		V		V	V	
	Mugilogobius chulae		V	V	V		
	Mugilogobius myxodermus		V	V	V		
	Oxyurichthys ophthalmonema				V		
	Papillogobius reichei				V	V	
	Periophthalmus modestus	V	V		V	V	
	Psammogobius biocellatus				V		
	Pseudogobius javanicus				V	V	
	Pseudogobius masago		V		V	V	
	Rhinogobius giurinus	V	V	V	V		
	Scartelaos histophorus				V	V	
	Tridentiger barbatus		V				
	Tridentiger bifasciatus		V		V		
	Wuhanlinigobius polylepis					V	
	Yongeichthys caninus				V		
Scatophagidae	*Scatophagus argus*		V				
Siganidae	*Siganus fuscescens*		V		V		
Osphronemidae	*Macropodus opercularis*	V	V	V			
Channidae	*Channa maculata*		V	V			
Tetraodontidae	*Takifugu niphobles*		V		V		

PS. The abbreviations indicate as follows. EX: extinct for local native population; EN: endangered species in the World; INV: invasive species

the recent ecological impact and address further useful suggestion for conservation progress and planning of some rare and endangered native fishes.

II. MATERIALS AND METHODS

The fishes were collected from over 25 different sampling sites of small tributaries, river basins, and also ponds, lakes, eastuaries, mangroves throughout around all Kinmen Island during 2011-2012 except for control area of military base. The inlandwater and mangrove sampling sites would be all located around the island from freshwater to brackish habitats. The fishing method included for current research would be as the employment of (1) hand-net, (2) fish-traps with small mesh size, (3) electro-fishing, (4) casting net, and (5) fishmen angling. The water quality and several aquatic environmental parameters would also be recorded. Identification of inlandwater fish species mainly follows Chan and Chang [1], Chen and Fang [2].

Those fish specimens would be sampled if the fishes need the further morphological identification as well as DNA sequencing database of native fish species. The voucher specimens were deposited in the Pisces collection of National Taiwan Ocean University, Keelung, (NTOUP).

III. RESULTS AND DISCUSSIONS

1. Update Checklist of Inlandwater Fishes from Kinmen Island

So far, there are totally 27 families, 57 genera and 68 species have been formally collected and recorded by our intensive survey for those freshwater habitats in inlandwater of Kinmen island, Fujian Province, Taiwan in our recent 2 years field survey (2011-2012) (Table 1). Among them, there are 21 fish species in freshwater habitats. For further downstream region, there are 54 fish species which could exist in brackish estuaries and mangroves. Beside the invasive species, the most dominant population in native freshwater fishes seems to be *Pseudorasbora parva*. Concerning the benthic fishes, the most dominant fish would be so-called *Rhinogobius giurinus* in most rivers, irrigation channel, ponds and lakes [3-5, 8].

The largest member of fishes is Family Gobiidae with 22 fish species; and second larger group is Family Cyprinidae with 5 fish species. Then, the third one would be Family Mugilidae with 4 fish species. Among them, totally 17 newly recorded native species were found in recent our current survey. The most speciose group would the gobies belonging to Family Gobiidae. The important discovery for this study would be that there are 12 newly recorded mangrove and inlandwater gobies found during 2011-2012 including as follows: *Amoya brevirostris*, *Apocryptodon punctatus*, *Boleophthalmus pectinirostris*, *Hemigobius crassa*, *Luciogobius* sp., *Oxyurichthys ophthalmonema*, *Papillogobius reichei*, *Psammogobius biocellatus*, *Pseudogobius javanicus*, *Scartelaos histophorus*, *Wuhanlinigobius polylepis*, amd *Yongeichthys caninus* in Gobiidae. Other remaining 5 new recorded fish species would be *Muraenesox bagio* in Muraenesocidae; *Sardinella lemuru* in Clupeidae; *Acanthopagrus schlegelii* in Sparidae; *Pelates quadrilineatus* in Terapontidae; and *Bostrychus sinensis* in Eleotridae (Table 2).

Table 2. The newly recorded fish species from Kinmen.

Family	Species name
Muraenesocidae	*Muraenesox bagio*
Clupeidae	*Sardinella lemuru*
Sparidae	*Acanthopagrus schlegelii*
Terapontidae	*Pelates quadrilineatus*
Eleotridae	*Bostrychus sinensis*
Gobiidae	*Amoya brevirostris*
	Apocryptodon punctatus
	Boleophthalmus pectinirostris
	Hemigobius crassa
	Luciogobius sp.
	Oxyurichthys ophthalmonema
	Papillogobius reichei
	Psammogobius biocellatus
	Pseudogobius javanicus
	Scartelaos histophorus
	Wuhanlinigobius polylepis
	Yongeichthys caninus

2. Endangered Population of Native Cyprinids

Among them, there are 2 families (Poeciliidae and Cichlidae) at least 3 invasive fish species which seem to be dominant for their invaded environment throughout most of inlandwater habitats. They are included as following invasive fish species: 1 species of mosquito fish: *Gambusia affinis*; 3 species of cichlids: *Oreochromis niloticus*, *Oreochromis* sp. and *Tilapia zillii* which already colonized into all different rivers and most of ponds. The current survey can found the more serious impact for those habitats especially with standing waters.

The dominance of invasive fishes have become great threat for local endangered species, *Metzia mesembrinum* which has been listed on governmental wildlife conservation list. Concerning for *Metzia mesembrinum*, the fish population have been completed extinct throughout all river basins of Taiwan although the hiostrical records for Taiwanese waters including Ilan, Chia-Yi, and Pingtung Counties have been confirmed and collected actually before the Japanese occupation period in Taiwan. Nowadays, the fish, *Metzia mesembrinum*, is very rare and the total population may be less than 1000 individuals by the estimation in 2011 summer, even facing more endangered status than that of endemic Formosan trout, *Oncorchynchus masou formosanus* which has been estimated over 5000 individuals. It would be very important to protect this species via conserving very restricted distributed regions of habitats in two rivers of Kinmen County.

3. Extinct Local Population of Native Fishes

In current study, it needs to immediately announce the serious impact for extinct local population of both native fish species: *Puntius synderi* and *Cobitis* sp. have been happened in recent year. *Puntius synderi* was found in Cheng's survey in 1960 and also the population is actually very rare and almost disappeared in Chen *et al*. in 2002. However, since 2002, no any field survey can find any individuals of *Puntius synderi* in Kinmen Island although it may also still extinct in southern part of Fujian Province. Another spined loach, *Cobitis* sp. which has only been recorded in Cheng's collection record. Since then, the spined loach has never appeared after their investigation. The loach may extinct due to lacking enough runny water habitats by over-use of river waters.

4. Conservation Task with Limitation of Water Resources

Agricultural irrigation is the basal demand for local farmer's economics which is very important traditional way for usage them for sorghum farming. During the day season for inlandwater habitats, the native fish population may need to face not only water pollution, habitat fragmentation, even also the complete drought in river bed for disappeared of local fish populations.

In the near future, the recycle of river water usage from downstream irrigation dam and real action for limitation river water usage for keeping all time wet whithin rivers may be the very important issue as rescue process to save many native fishes to pass the dry season problem due to human's overuse of water resources.

On the other hand, the invasive fish problem is also exist, it would be very important to consider the elimination for all species of aggressive cichlids herein from the native habitats for saving and keeping the sustainable native fish population and community under conservation monitoring.

ACKNOWLEDGMENTS

The first author wishes to thank the Agriculture Council as Kinmen County Government for support the research grant for field survey of inlandwater fish fauna and fish resources status for their conservation issue. Others in NTOU may not list as coauthors would be also appreciated for their help for lab's research and field trips.

REFERENCES

1. Chen, I-S. and Chang, Y. C., *The Photographic Guide of Inlandwater Fishes, Vol. I, Cypriniformes*, Sheichuan Press, Keelung (2005).
2. Chen, I-S. and Fang, L. S., *The Freshwater and Estuarine Fishes of Taiwan*, National Museum of Marine Biology and Aquarium, Pingtung (1999). (in Chinese)
3. Chen, I-S. and Shao, K. T., "A taxonomic review of the gobiid fish genus Rhinogobius Gill, 1859, from Taiwan, with description of three new species," *Zoological Studies*, Vol. 35, No. 3, pp. 200-214 (1996).
4. Chen, I-S., Wu, J. H., and Fang, L. S., *The Inlandwater Fishes of Kinmen, Fujian Province*, Kinmen National Park Press, Kinmen (2002). (in Chinese)
5. Cheng, T. R., "Preliminary investigation of fishes in Kinmen," *Chinese Fishery*, pp. 24-27 (1960). (in Chinese)
6. Jordan, D. S. and Evermann, B. W., "Notes on a collection of fishes from the island of Formosa," *Proceedings of the United States National Museum*, Vol. 25, No. 1289, pp. 315-368 (1902).
7. Oshima, M., "Notes on freshwater fishes of Formosa, with descriptions of new genera and specie," *Proceedings of the Academy of Natural Sciences of Philadelphia*, Vol. 72, pp. 120-135 (1920).
8. Regan, C. T., "Descriptions of new freshwater fishes from China and Japan," *Annals and Magazine of Natural History (Series 8)*, Vol. 1, No. 2, pp. 149-153 (1908).
9. Wu, H. L. and Ni, Y., "On two new species of *Mugilogobius* Smitt (Perciformes: Gobiidae) from China," *Zoological Research*, Vol. 6, No. 4, pp. 93-98 (1985). (in Chinese)