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New advances on population status and protective measures for *Lipotes vexillifer* and *Neophocaena phocaenoides* in the Changjiang River

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Summary

This paper reports the population status of the endangered Chinese River dolphin—*Lipotes vexillifer*, the factors causing the population decline of *Lipotes* and protective measures adopted in recent years, such as semi-capture reserve, studies on reproduction under the artifical rearing conditions and natural reserve as well as their advances. It also reports the status of population and protection of another dolphin in the Changjiang River, namely the black finless porpoise—*Neophocaena phocaenoides*.

Introduction

Since 1978, the Institute of Hydrobiology, Academia Sinica has carried out long-term, systematic and thorough studies on the Chinese river dolphin—*Lipotes vexillifer* in the Changjiang River and, in the main, clarified the distribution, population size and regular changes as well as the factors causing animal death. On the basis of this work, the institute raised three main measures for protecting *Lipotes*, namely, establishment of a semi-capture reserve, intensifying studies on reproduction under artifical rearing conditions and establishment of a natural reserve. Under the close coordination with departments of fisheries and environmental protection, much work has been done on these three main measures. At the same time, we have successfully reared a live specimen of *Lipotes* for 11 years up to now. Therefore, overall studies on reproductive biology, behavioural biology, physiology, biochemistry and acoustics, etc. have been carried out and a series of the stages in achievement has been obtained.

At the time of studies on *Lipotes*, we made systematic studies on population, activity regularity and rearing reproduction of the black finless porpoise—*Neophocaena phocaenoides* and collected much data.

Status of the Population Size of *Lipotes*

Before 1950s, population of *Lipotes* was widely distributed in the Changjiang River. Since 1960s, its population has rapidly declined. Now is is estimated that only 200 individuals survive and the number is continuously falling towards extinction. *Lipotes* is the most endangered species among cetaceans. According to our studies, *Lipotes* gives birth every two years and has one young at each birth. Its sexual ratio is about 1:1. The female reaches maturity at 8 years old and mature females comprise about 30% of the whole female group. Among the mature individuals, 30% get pregnant. Calculated from 200 individuals of the population at present in the Changjian River, females number about 100 individuals among which 30 are mature ones and 9 can get pregnant. However, it is impossible to ensure whether all calves survive because of the complex environment in the Changjiang River. Therefore, additional groups are very few. The factors causing such a serious situation are as follows:

1. Heavy use of harmful fishing gears is the direct factor that causes *Lipotes* accidental injury. According to our incomplete statistics, among *Lipotes* deaths of 100 individuals from 1950s to the arly 1960s, half of them were accidentally killed by rolling-hook lines. Fishing by using electricity and explosives furthermore caused *Lipotes* to die an unnatural death in whole groups. 20 individuals were accidentally killed in 1984 alone. Since then, the use of harmful fishing gears has been reduced year by year due to massive propagational education and law for protection measures formulated by the Chinese government. The unnatural death of *Lipotes* has happened less but is has still occurred sometimes.

2. Destruction of the existing environment is an indirect factor causing the population decline of *Lipotes*. Environments, such as water area sandbars in the Changjiang River and emergence into the river by streams, are the main places in which fish are found in large numbers and where *Lipotes* feed, rest and nurse their calves. In recent years, harmful fishing gear of trapnets have been used extensively in these waters. It not only makes *Lipotes* lose its food source but also seriously affects its activities. According to our investigations from 1990 to 1991, a kind of drift gill net is widely used (it consists of three layers of nets. The mesh size of the two outer layers is about

45 cm and the middle layer is about 1.3 cm. Therefore, it can catch both large-sized fish and small-sized fish). During fishing, it stretches across the shallow water channel and floats down along with water current. Though no accidental death of *Lipotes* is reported yet, it can directly cut off the progress of *Lipotes*.

3. The rapid development of commercial navigation not only causes *Lipotes* unnatural deaths but also seriously interferes with the normal activities of *Lipotes* due to loud noise levels. For an example, the Chenglingji section of the Dongting Lake mouth is an ideal environment for *Lipotes*. According to our recent 3 years investigation, this section is not wide but many ships go up and down. The noise of the ships' engines is deafening and the normal activities are seriously interfered with.

4. Sewage discharge from the development of industry and a great amount of water from the increased shipping also create disadvantages for *Lipotes* survival.

Recent Progress of Conservation and Management of *Lipotes*

In view of the situation of imminent danger faced by *Lipotes* population and the actual status of the Changjiang River, we suggest the following urgent preservation measures for *Lipotes*:

1. In view of the difficulty of controlling open waters of the Changjiang River, we selected Tian-e-zhou, which is a bypassed semicircular bend or oxbow of the Changjiang river near Shishou City, Hubei and covers 2666 h. of water area, to make thorough studies. The oxbow maintains a natural environment suitable for *Lipotes* existence. It has the advantages of abundant fish resources, less human activites, no industry pollution and easy artificial control. After we clarified background data of water quality, food resources and hydrogeology of the oxbow, we moved five *Neophocaena phocaenoides* into the oxbow for simulation test in 1990. The test results show that *Neophocaena* can not only well live in the oxbow but also can normally give birth and nurse calves there. Therefore, it provides the sufficient suitable conditions for introducing *Lipotes* into the oxbow.

As the population number of *Lipotes* is very few, it does not allow any big error in the protection work. Therefore, we have suggested the establishment of a semi-captive reserve as a test model for *Lipotes* and to enlarge such a reserve when experience improves. We are confident that if 2 to 3 groups numbering 10 to 20 individuals can be introduced into this oxbow, it must be possible effectively to protect this animal.

2. Intensive studies on reproduction under the artificial rearing conditions must be carried out. There are many examples showing that rare and endangered species can be effectively protected under artifical rearing conditions. Though it is much more difficult to protect *Lipotes*, it is one of the effective measures. It is conceivable that if rearing management is appropriate and *Lipotes* can live for about 20 years under the artificial rearing conditions, if 2 to 3 pairs of *Lipotes* can be reared and if they can reproduce, it can play an important role in protection of this species. In the past, we have successfully reared a *Lipotes* for 11 years under very bad conditions and completed basic studies on reproduction under the rearing conditions so as to accumulate much data. Now we are training the dolphin for artificial collection of sperm and great progress has been made. We hope that a gene bank of sperm and body cells of *Lipotes* can be established in the near future. Now we are building the rearing and reproductive facilities to international levels for *Lipotes*. The conditions for establishing a research centre for *Lipotes* in the Institute of Hydrobiology are ripe. Studies of reproduction under artifical rearing conditions and establishment of gene bank of sperm and body cells can be carried out in the institute so as to make contributions to the preservation of the species.

3. A natural reserve for *Lipotes* must be established. Honghu, Shishou and Anqing sections of the Changjiang River are the main distribution areas of *Lipotes*. It is possible to retard the extinction rate of *Lipotes* in the Changjiang River by establishing administrative agencies, prohibiting the use of harmful fishing gears and protecting ecological environment.

Since 1990, we have been establishing a reserve for *Lipotes* in the section from Xintankou to Luotian and all work has been carried out smoothly under the support of National Ministry of Agriculture and National Bureau of the Environmental Protection.

We have done much work these years around the above-mentioned three main measures for *Lipotes* but there are still great difficulties, especially to catch safely a certain number of *Lipotes* for semi-capture reserve and artificial rearing. It costs a lot of manpower and material resources, since the environmental conditions in the Changjiang River are complicated, the number of *Lipotes* is few and catching methods are backward. In addition, much money is needed for this work and our government is in economic difficulties. All these factors make difficulties for the protection of *Lipotes*. It is fortunate that the Chinese government lays great stress on protection of *Lipotes* and many people and organizations abroad also show great concern for protecting this species. We are confident that this endangered species will be effectively preserved.

Status of the Population and Protection of Black Finless Porpoise—*Neophocaena phocaenoides*

Neophocaena phocaenoides is another cetacean that lives in the Changjiang River. Its distribution range is

wider than that of *Lipotes*, from upper reaches of Yichang to the mouth of the river and mouths of large-sized lakes such as Dongting Lake and Poyang Lake as well as branch streams which connect with the river. According to our investigations from 1978 to 1991, the population of *Neophocaena* is greater than that of *Lipotes*. For example, during the investigation from November 15, 1990 to December 9, 1990, 432 individuals of *Neophocaena* were observed in the section from Xintankou of Honghu City to Xinchang of Shishou City, 332 km in total length. It means that there is an average of 1.3 individuals per km. Though we are sorting out statistic data of the actual populaton of *Neophocaena* in the Changjiang River, the preliminary estimation is that there are about 2000 individuals of *Neophocaena* distributed in the section from the mouth of the river to Yichang, 1600 km in total length.

According to our 12 years studies, *Neophocaena* maintains a relatively high reproduction rate. For example, 3 *Neophocaena* caught in Shishou in January, 1979 were all pregnant; 25 individuals were caught in Dongting Lake in December 1984 and 7 individuals were mature ones among which 5 were pregnant (71.43%), 8 individuals were caught in April, 1990 and 6 were female among which three were pregnant, one was immature and the other two probably hadn't yet reached sexual maturity. In the light of group structure, among 25 individuals caught in December 1984, the ratio of female to male is 2:1. five were junior below one year old (20.83%), eight were immature, (33.3%), eleven were mature, (45.83%), and among seven mature female ones, five were pregnant (71.4%). Therefore, it may be considered that *Neophocaena* is a healthy population. This situation forms a sharp contrast to *Lipotes*.

Before the 1980s, *Neophocaena* didn't receive protection and was killed wantonly. As *Neophocaena* is very cordial to humans and often plays and feeds near shore or in the mouth of the river, it is easily caught. Therefore, fisherman can use fish forks or other fishing gear to catch or kill it. In 1978, the writer recieved 18 *Neophocaena* killed by such methods. Additionally, during the dry season in winter, the movement of *Neophocaena* is often restricted by areas of shallow water, causing death on a large scale. For example, fishermen reported that there were 100 *Neophocaena* stranded in the shallow water area of Dongting Lake in 1970s. When fishermen catch *Neophocaena*, they refine its fat to oil for selling and eat its meat. In order to protect *Neophocaena* resources, the chinese government listed it as a protected animal of second grade. By the massive propagation and legislative protection, *Neophocaena* has been well protected in recent years.

Conclusion

The population of *Lipotes* is less than 200 individuals at present and is continuously declining. Such a situation causes people to be seriously worried. The factors causing the rapid decline of its population is mainly from human activities which accidentally kill it. Although *Lipotes* has been listed as the protected animal of the first grade by the government and the appropriate law has been drawn up, it is difficult to avoid these factors causing its death and such situation will be continuously getting worse. This is because fisherman want to catch fish for their living; industry and navigation need to be developed; water conservancy projects need to be constructed and rivers need to be realigned. Therefore, the establishment of semi-capture reserve and aritificial rearing for protecting this endangered species is imperative. During the past ten years, in order to protect *Lipotes*, departments of scientific research, fisheries and environmental protection have done much work. Although the protective work has many difficulties, as long as the government attaches importance to this matter, the management will be intensified and cooperative research strengthened, there is hope for protection of this animal. On the contrary, it will be a serious mistake if there is any delay as *Lipotes* is in such an endangered situation.

The population of *Neophocaena* is relatively high in the Chngjiang River at present and it seems healthy but it should be protected over time and we should draw an historical lesson from that of *Lipotes*.

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