Extinction of the Japanese otter:
- lessons from its extinction -

The only one photo of the Japanese otter taken in the field (1971).

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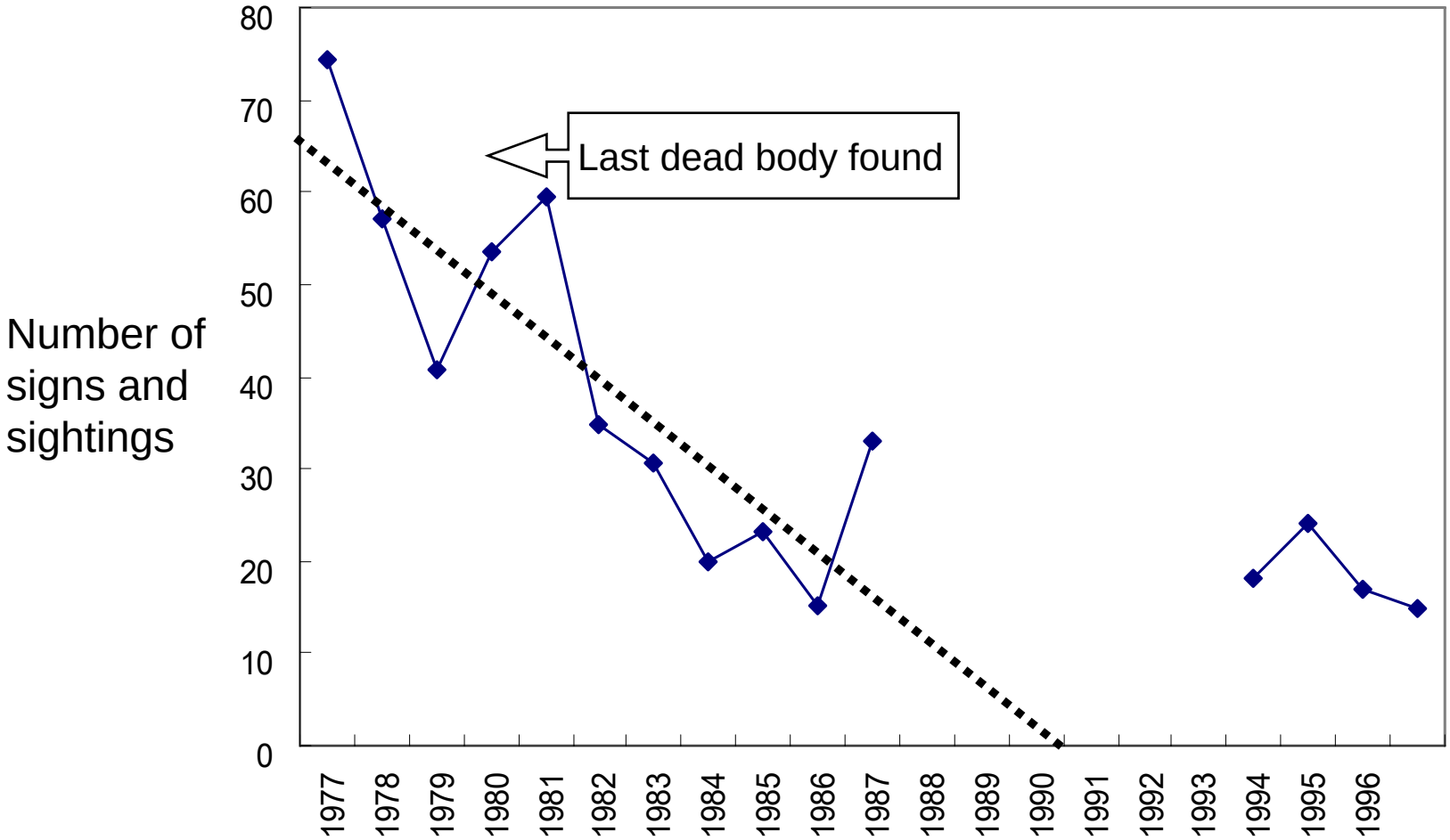
Sung-yong HAN and Hyeong-Hoo KIM



The Japanese otter population seems to have gone extinction in early 1990s.

Presently the Japanese otter survives only in the memory of people.
But we still have jobs to be done.

JOB 1: Is the Japanese otter a 14th species ?

Scientific name - old	Scientific name - new	English name
Amblonyx cinereus	*Aonyx cinereus*	Small-clawed otter
Aonyx capensis	***Aonyx capensis***	Cape clawless otter
Aonyx congica	***Aonyx congicus***	Congo clawless otter
Enhydra lutris	***Enhydra lutris***	Sea otter
Lontra canadensis	***Lontra canadensis***	North American river otter
Lontra felina	***Lontra felina***	Marine otter
Lontra longicaudis	***Lontra longicaudis***	Neotropical otter
Lontra provocax	***Lontra provocax***	Southern river otter
Lutra lutra	***Lutra lutra***	Eurasian otter
Lutra maculicollis	***Lutra maculicollis***	Spotted-necked otter
Lutra perspicillata	***Lutra perspicillata***	Smooth-coated otter
Lutra sumatrana	***Lutra sumatrana***	Hairy-nosed otter
Pteronura brasiliensis	***Pteronura brasiliensis***	Giant otter

Though there are indications* that the Japanese otter (*Lutra nippon*?) might be distinct from *Lutra lutra*, Klaus-Peter Koepfli recommended that it should not be separated as a 14th species until evidence can be improved. (C. Reuther, October 1, 2003)

*Suzuki, T., Yuasa, H., and Machida, Y. 1996. Phylogenetic position of the Japanese river otter *Lutra nippon* inferred from the nucleotide sequence of 224 bp of the mitochondrial cytochrome b gene. Zoological Science 13: 621-626.

*Imaizumi, Y. and Yoshiyuki, M. 1989. Taxonomic status of the Japanese otter (Carnivora, Mustelidae), with a description of a new species. Bulletin of the National Science Museum Tokyo Series A 15: 177-188.

From external measurement items *L. nippon* and *L. lutra* are not different

	T.L. (cm)	H.B. (cm)	Tail (cm)	Weight (kg)	Reference
Lutra nippon (n=4)	116.2	70.3 (64.5-82)	45.9 (39-48.9)		Imaizumi, 1960
Lutra nippon ♂ (Ehime / Kochi prefs. n=7)	116	71 (54-80)	45 (35-56)		Yamazaki, 1997
Lutra nippon ♀ (Ehime / Kochi prefs. n=3)	109	68 (62-72)	43 (37-50)		Yamazaki, 1997
Lutra lutra ♂ (Korea, n=6)	116.7 (111-122)		48.2 (46-51)	7.15 (5.2-8.1)	Kim, 2002
Lutra lutra ♀ (Korea, n=6)	103.7 (100.4-110)		43.2 (40.5-45.6)	5.48 (4.9-6.4)	Kim, 2002
Lutra lutra ♂ (Eastern Europe, North Asia)	120	70-75		7.0-10.0	Ognev, 1931

Osteological position of the Japanese otter

The Japanese otter *Lutra nippon* was not so different in length items as the Eurasian otter from China, but was obviously larger than in zygomatic width than *Lutra lutra*.

(Endo et al., 2000)

Skull of Japanese Otter

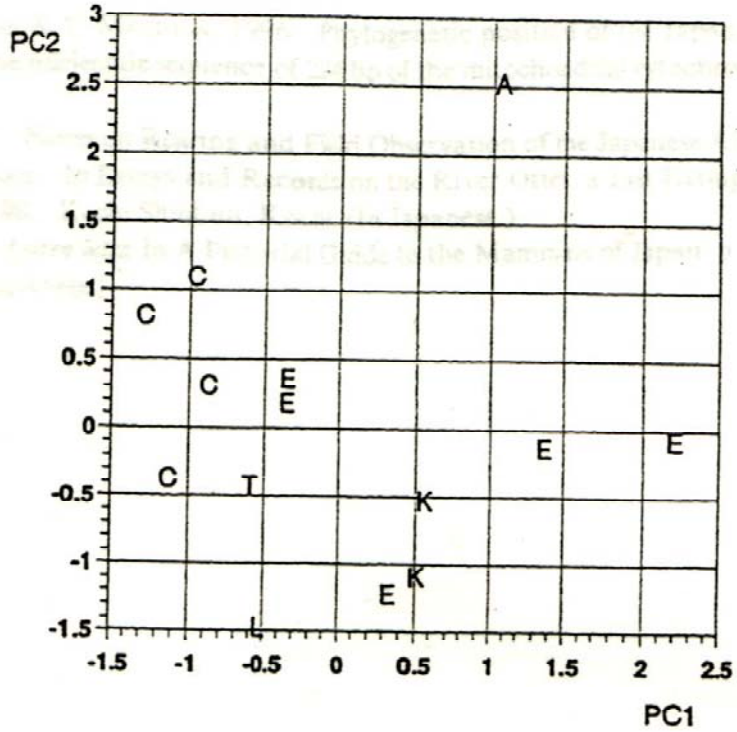


Fig. 3. The principal component chart of skulls between the first and second transformed variables from 16 measurement items. E, the plots of the specimens from Ehime Prefecture. K, Kochi population. C, China population. T, Taiwan indidual. L, *Lutra lutra* specimen without locality data. A. *Aonyx cinerea* specimen without locality data. PC1, the first principal component. PC2, the second principal component. The percentage of the variation explained by PC1 is 60.2, and that by PC2 is 19.9. The items, which largely contribute to the first principal component, are LC, LA and GMB in higher ranking, and to the second principal component, are LBO, LCR and GNB.

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Consensus   TTTTGGATCY CTRCTAGGAA CYTGCTTAAT CCTTCAGATT CTTACAGGTT TATTTTTAGC CATACACTAC ACATC    75
L.n.        .........T ..A..... .C........ .......... .......... .......... .......... .....    75
L.l.l.      .........C ..A..... .T........ .......... .......... .......... .......... .....    75
L.l.c.      .........C ..G..... .C........ .......... .......... .......... .......... .....    75

Consensus   AGACACAACC ACAGCCTTCT CATCAGTCGC ACACATYTGC CGAGACGTCA ACTACGGCTG RATTATYCGR TAYAT   150
L.n.        .......... .......... .......... ......T... .......... .......... A.....T..G ..T..   150
L.l.l.      .......... .......... .......... ......C... .......... .......... G.....C..A ..C..   150
L.l.c.      .......... .......... .......... ......T... .......... .......... G.....C..A ..C..   150

Consensus   ACACGCAAAC GGAGCCTCYA TATTCTTCAT CTGCCTGTTC CTACATGTAG GACGCGGCCT RTACTACGGA TCTT    224
L.n.        .......... ........T. .......... .......... .......... .......... A.......... ....   224
L.l.l.      .......... ........C. .......... .......... .......... .......... G.......... ....   224
L.l.c.      .......... ........C. .......... .......... .......... .......... A.......... ....   224
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Fig.1 Comparison of 224bp DNA sequence of mitochondrial cytochrome b gene of *Lutra nippon* with those of two subspecies (*lutra and chinensis*) of *Lutra lutra*.

Phylogenetic position of the Japanese otter *Lutra nippon*

(Suzuki et al., 1996)

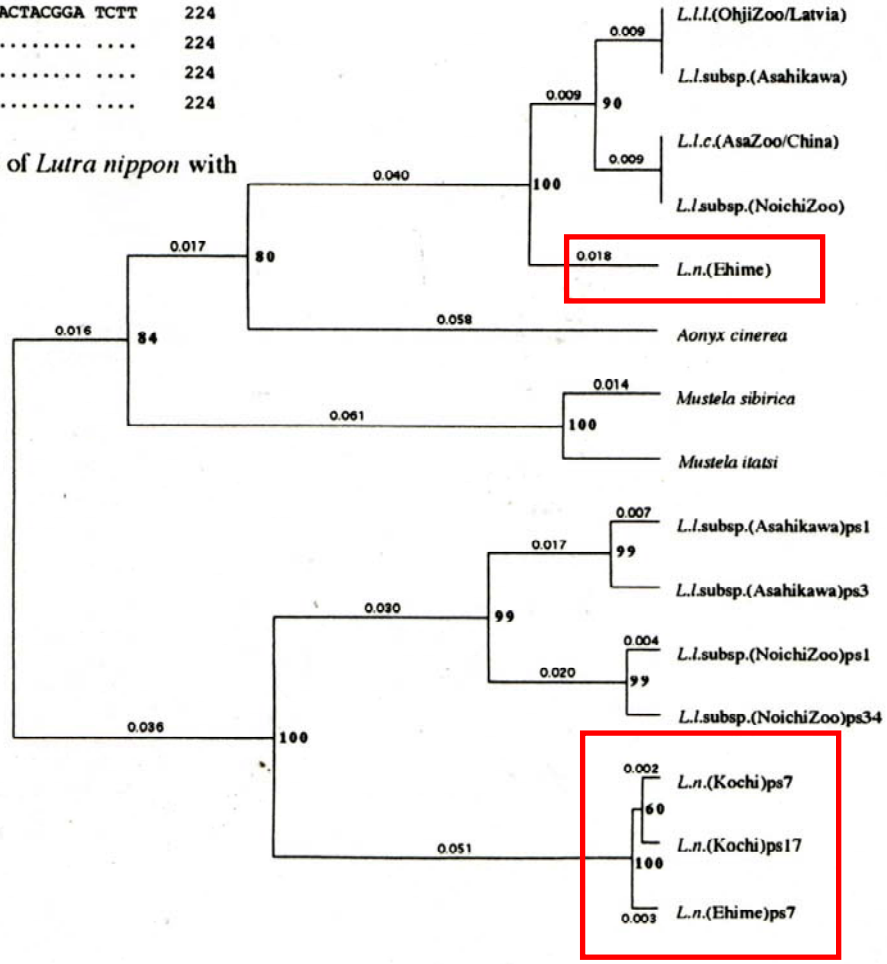
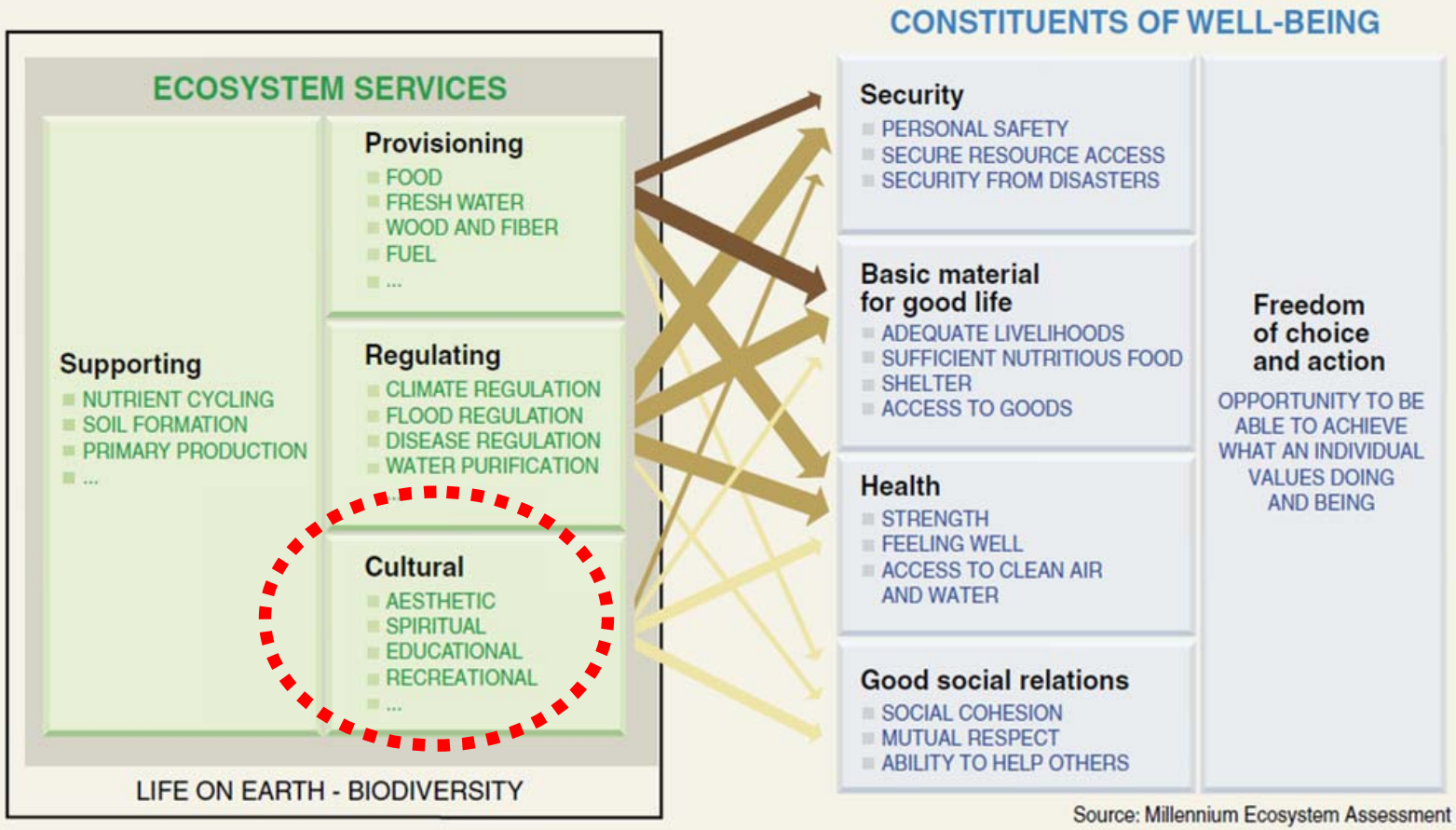


Fig.2 A UPGMA-phylogenetic tree constructed from the 224bp sequence data. The numbers at each branching point show bootstrap values. The lower part of the tree shows the tree obtained from the sequence data of the pseudo-gene of cytochrome b.

JOB 2: Clarification of roles that the Japanese otter played in the local culture

Figure A. Linkages between Ecosystem Services and Human Well-being

This Figure depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered, and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage. (For example, if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors—including other environmental factors as well as economic, social, technological, and cultural factors—influence human well-being, and ecosystems are in turn affected by changes in human well-being. (See Figure B.)



Source: Millennium Ecosystem Assessment

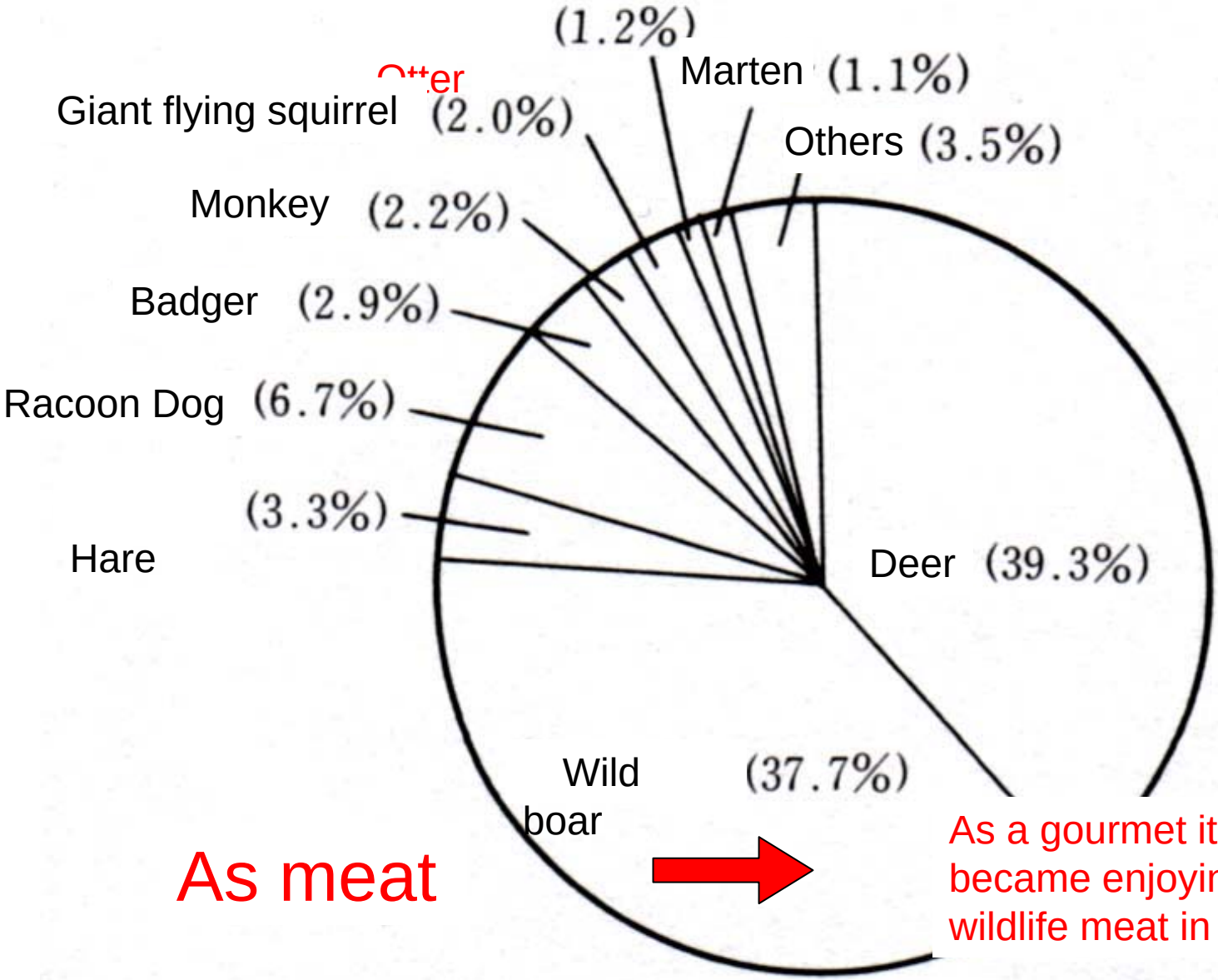
Only a century ago, lowlands of Japan was covered by wetlands (= otter lands).

胸まで沈む湛水田での稲刈り

Photo： 1950

Ancient name of Japan meant “country of rich reed bed (豊葦原瑞穂国)” or “island of many dragonflies (大日本豊秋津洲).”

Otters were common countrywide till 18th century.



As meat

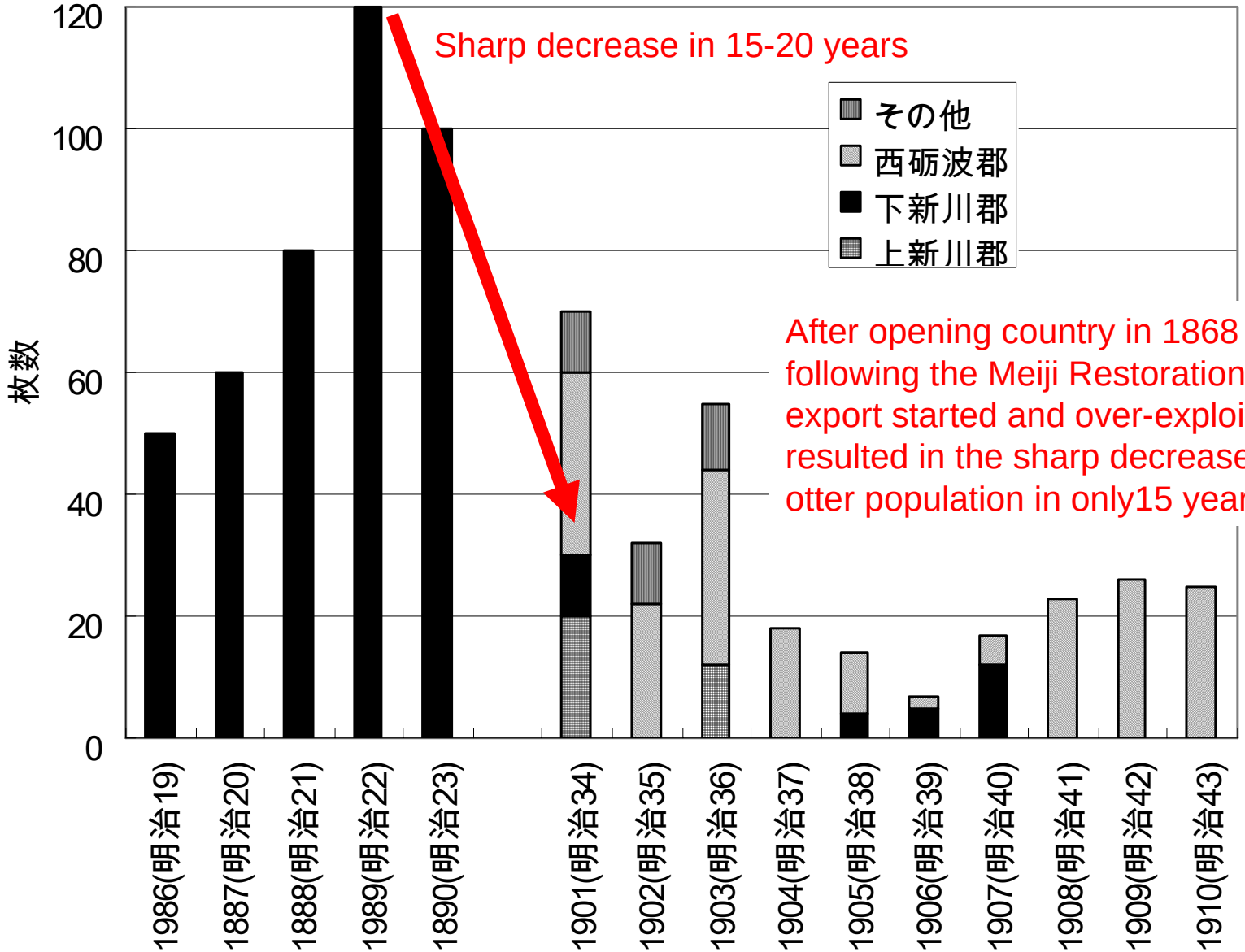
As a gourmet item: people became enjoying variety of wildlife meat in 18th century.

Composition of animal remains found from a Japanese archeological site about 3,000 years ago.

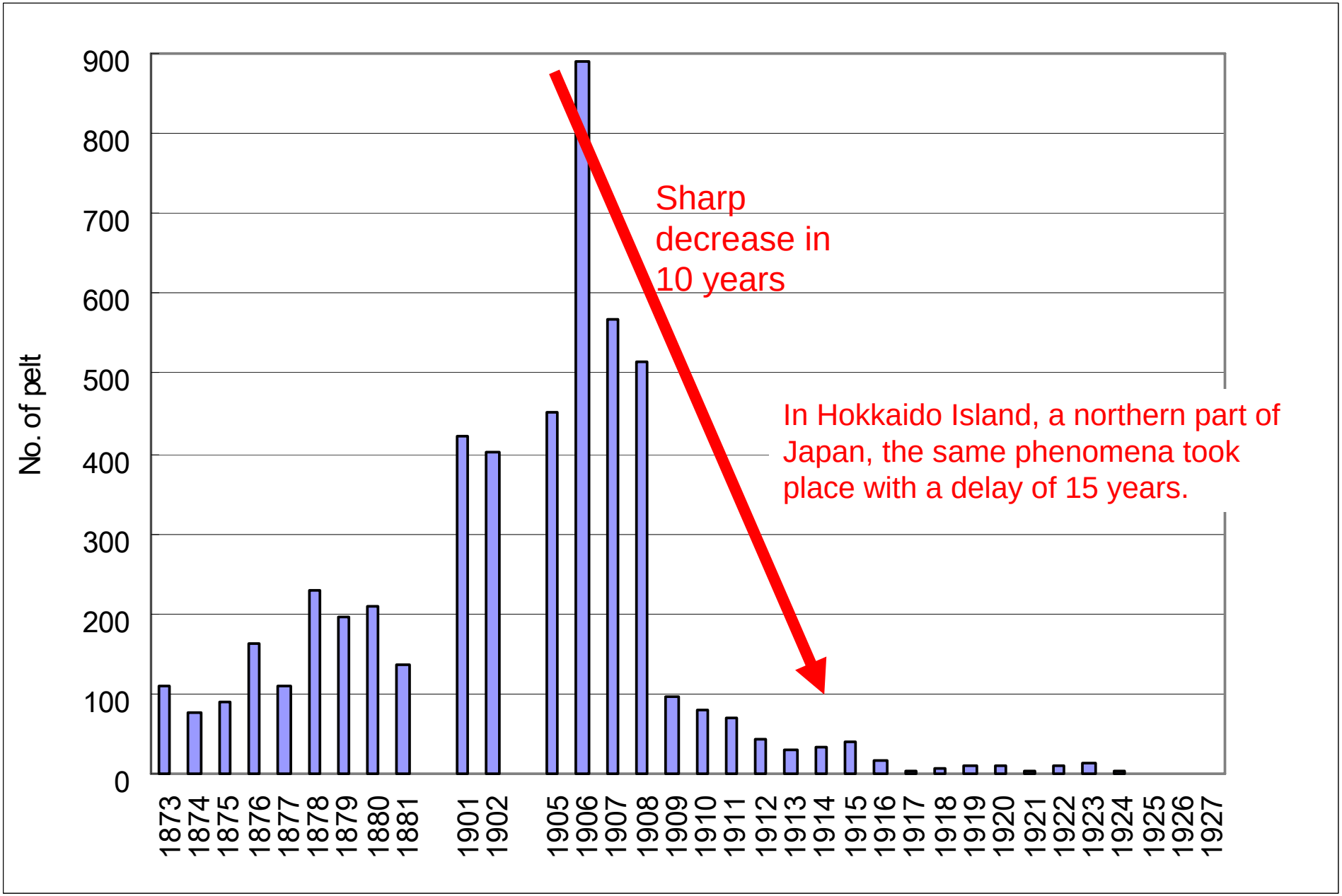
Hunting for pelt before 18th century was sustainable

Snare and automatic spear used by Ainu people in Hokkaido Island.

Otter pelt production in Toyama Prefecture for export



After opening country in 1868 following the Meiji Restoration, pelt export started and over-exploitation resulted in the sharp decrease of otter population in only15 years.



Number of captured otters in Hokkaido Is.

Otter was also important as medicine for tuberculosis

Newspaper advertisements of early 20th century.
Medice price was 300US$ (at present monetary value) for dose of 40 days.

1900s-1930s

Otter pelt production for military demand.

1929:

Japanese government urged establishment of "Hunters' Association" aiming at efficient collection of pelts for military use.

1930-1950

No information due to war time

1955-1959:

Last records from Honshu, Kyusyu and Hokkaido Islands.

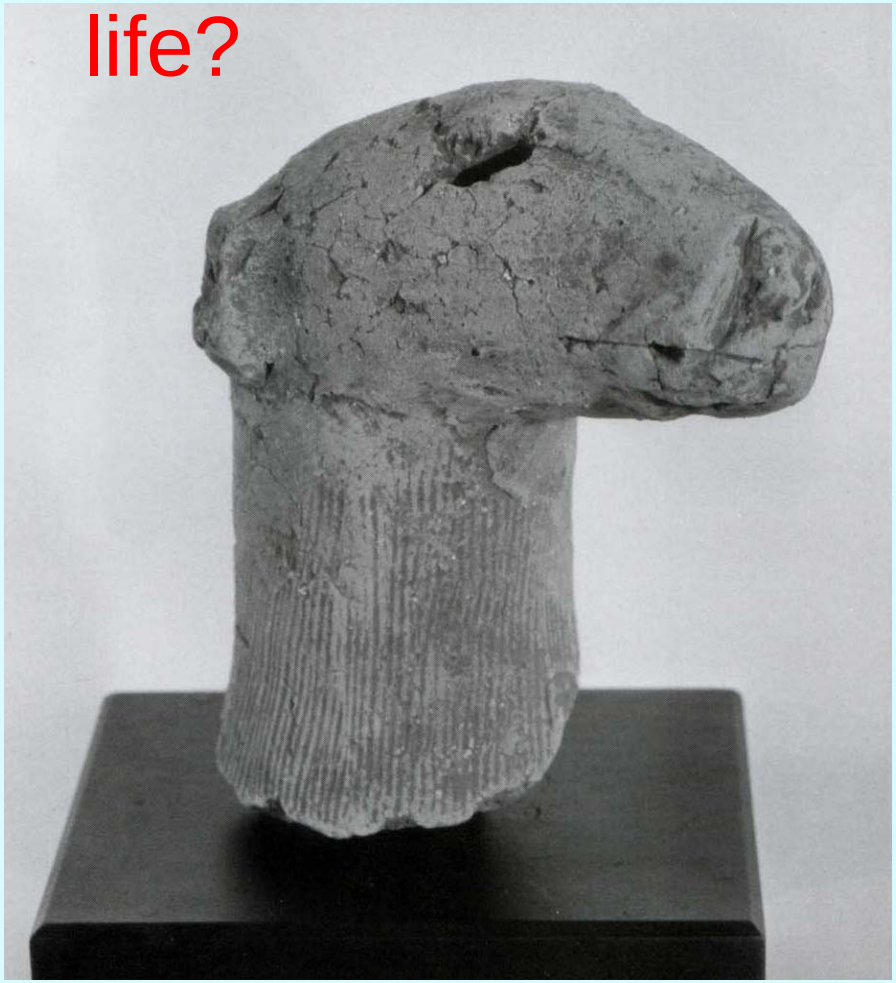
1979:

Last sighting at Shikoku Island.

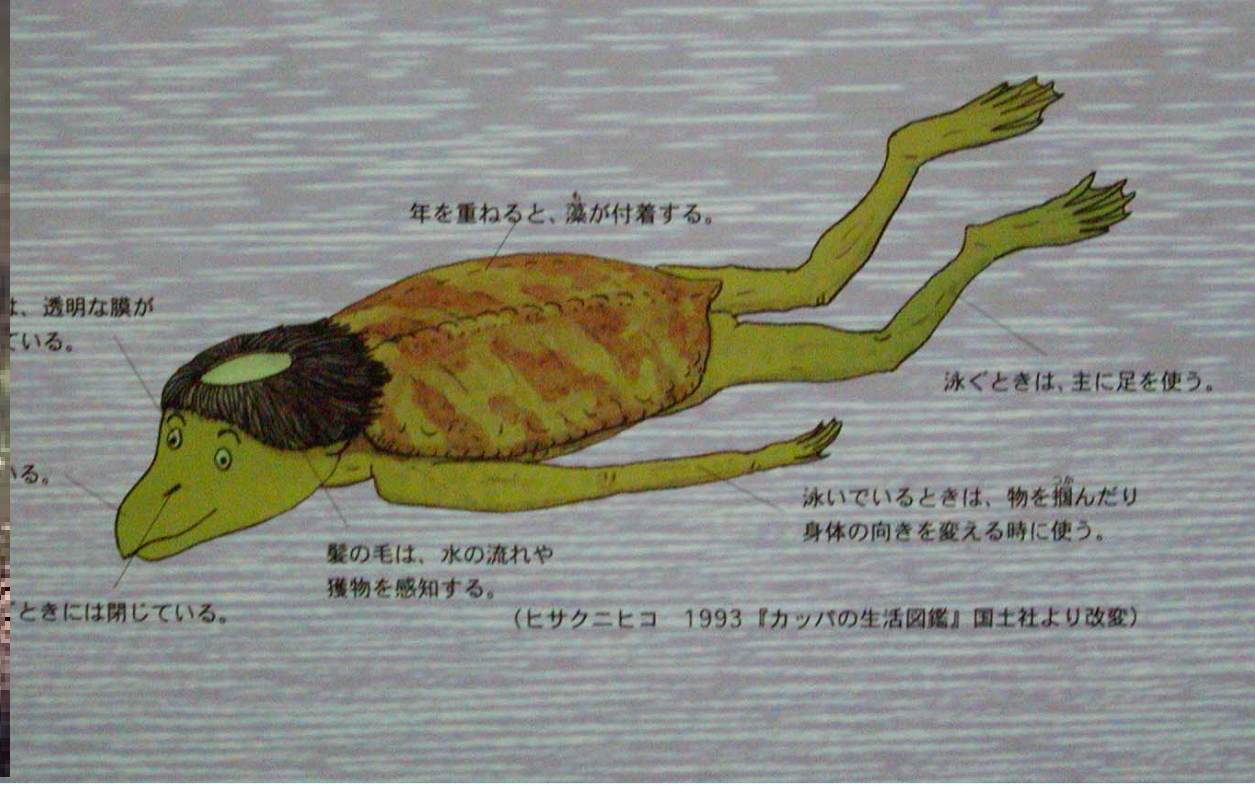
1990s:

Extinction

How the otter enriched people's spiritual life?



Clay image of the otter head about 1,500 years ago：as some kind of symbolic entity?



The otter provided us with many stories.

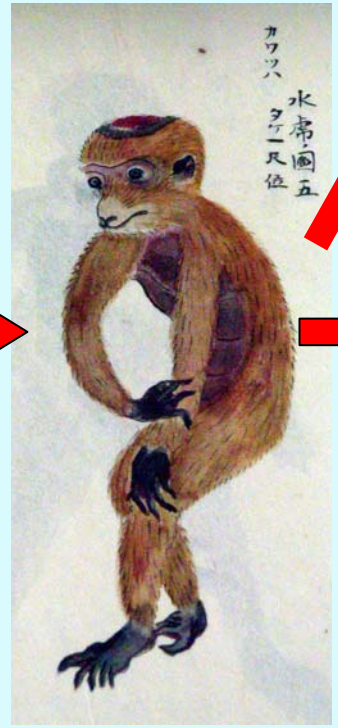
As a model of an imaginary animal “Kappa (a water sprite)”
(a mixture of otter, monkey, turtle frog and human).

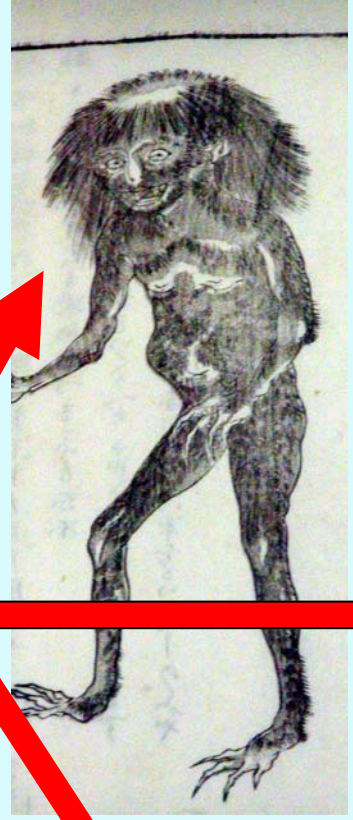
So-called ‘Hand of Kappa’ kept in a local temple

Human-type went extinction in 18th century.

Otter was the fearful model of ‘Kappa’ In 16th century.

‘Kappa’ is still surviving in 21st century in a comical form.





Monkey-type became the mainstream in 17th century.

Phylogeny of ‘Kappa’

Turtle-type went extinction in 19th century.

An otter appeared in the Japanese-style painting in 17th century.

An otter appeared in the Japanese-style short poem “Haiku.”

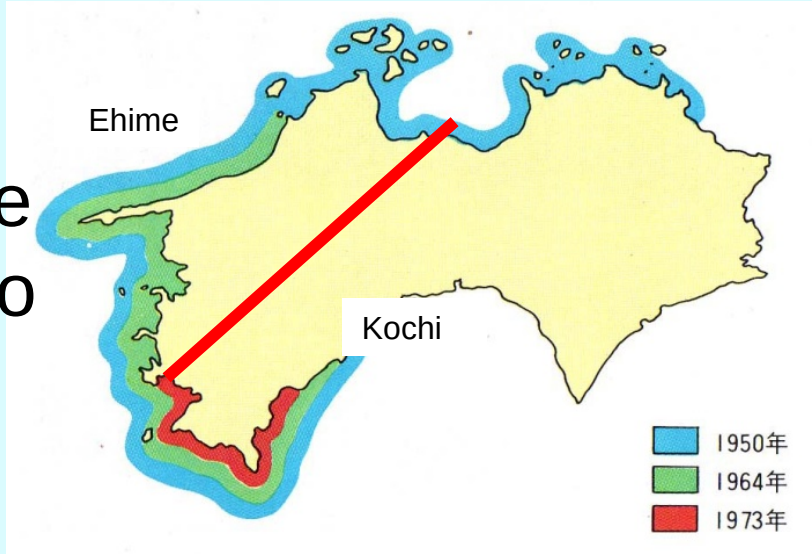
JOB 3: What lessons we can learn from the extinction of the Japanese otter?

Lesson 1:

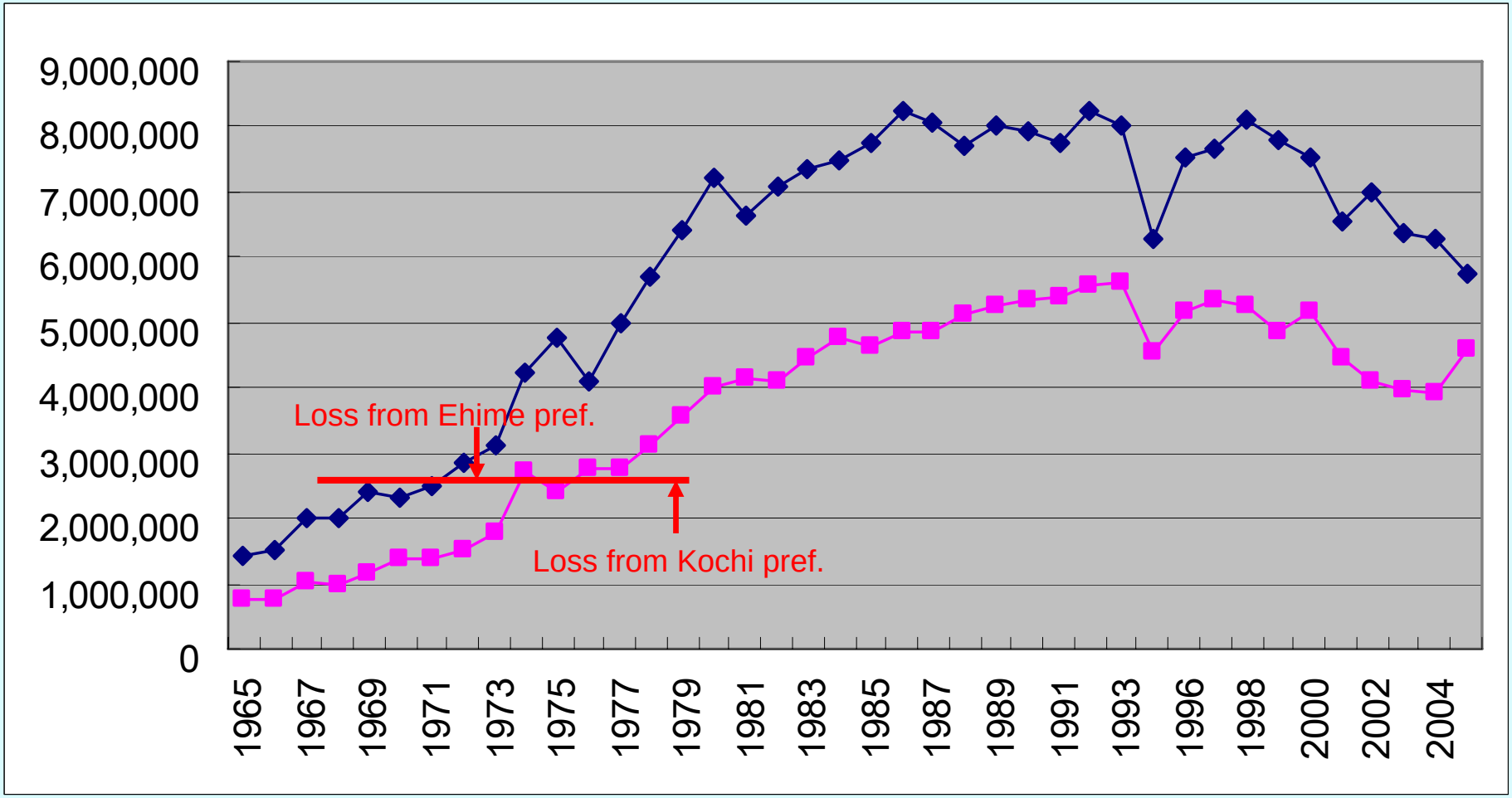
Commercial hunting was the major cause of otter decrease though traditional use was sustainable.

Lesson 2:

Absence of information exchange between local governments led to the loss of the last chance for conservation.



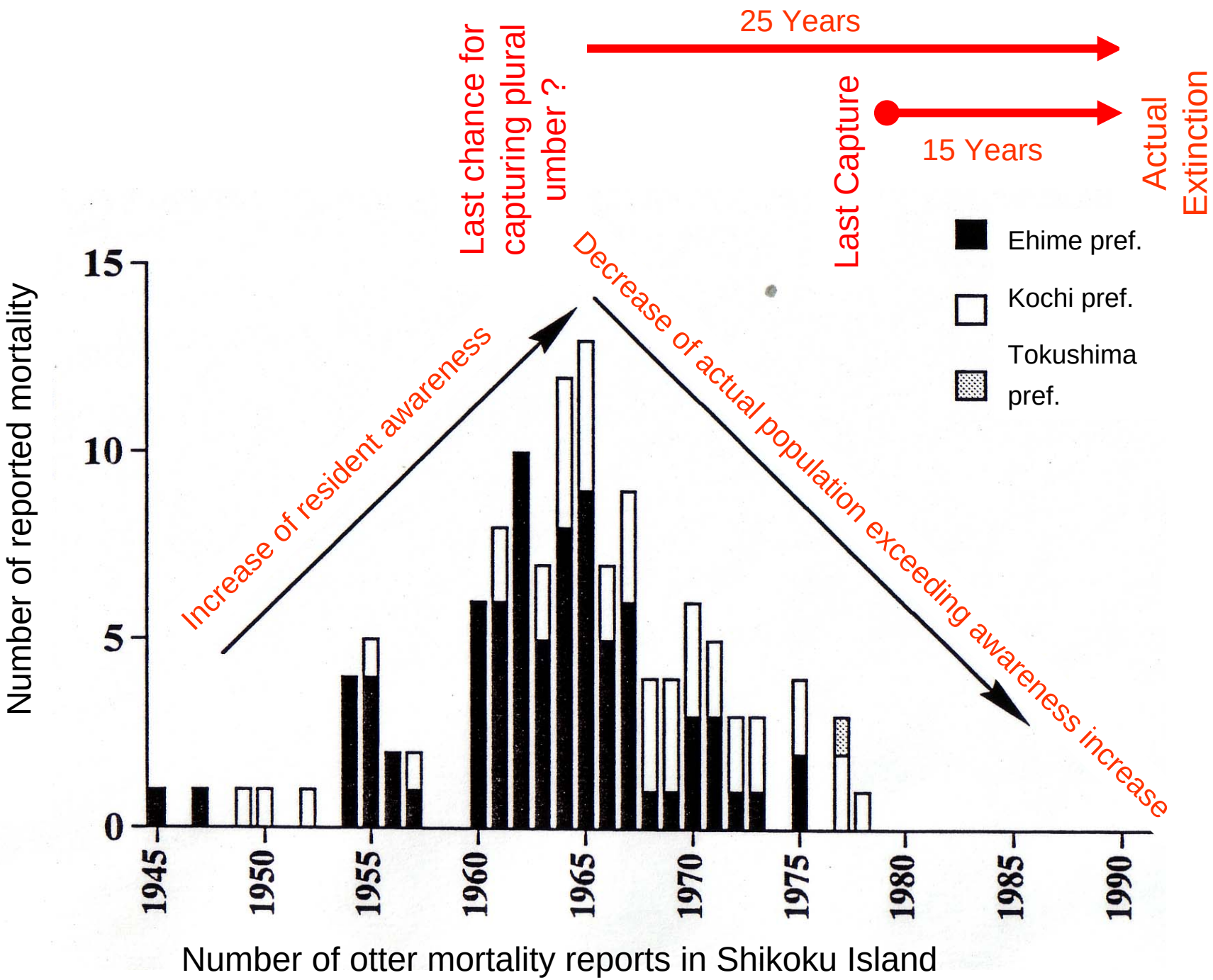
	Ehime Pref.	Kochi Pref.
1950s	Campaign by a local scientist	
1960	Distribution survey	
1964	Designated as “Prefectural Animal”	(believed not occur in Kochi)
1970	Almost disappeared	
1972		Start of distribution survey
1979	Last capture record	
1990		Survey by Environment Agency
1990s		Extinction

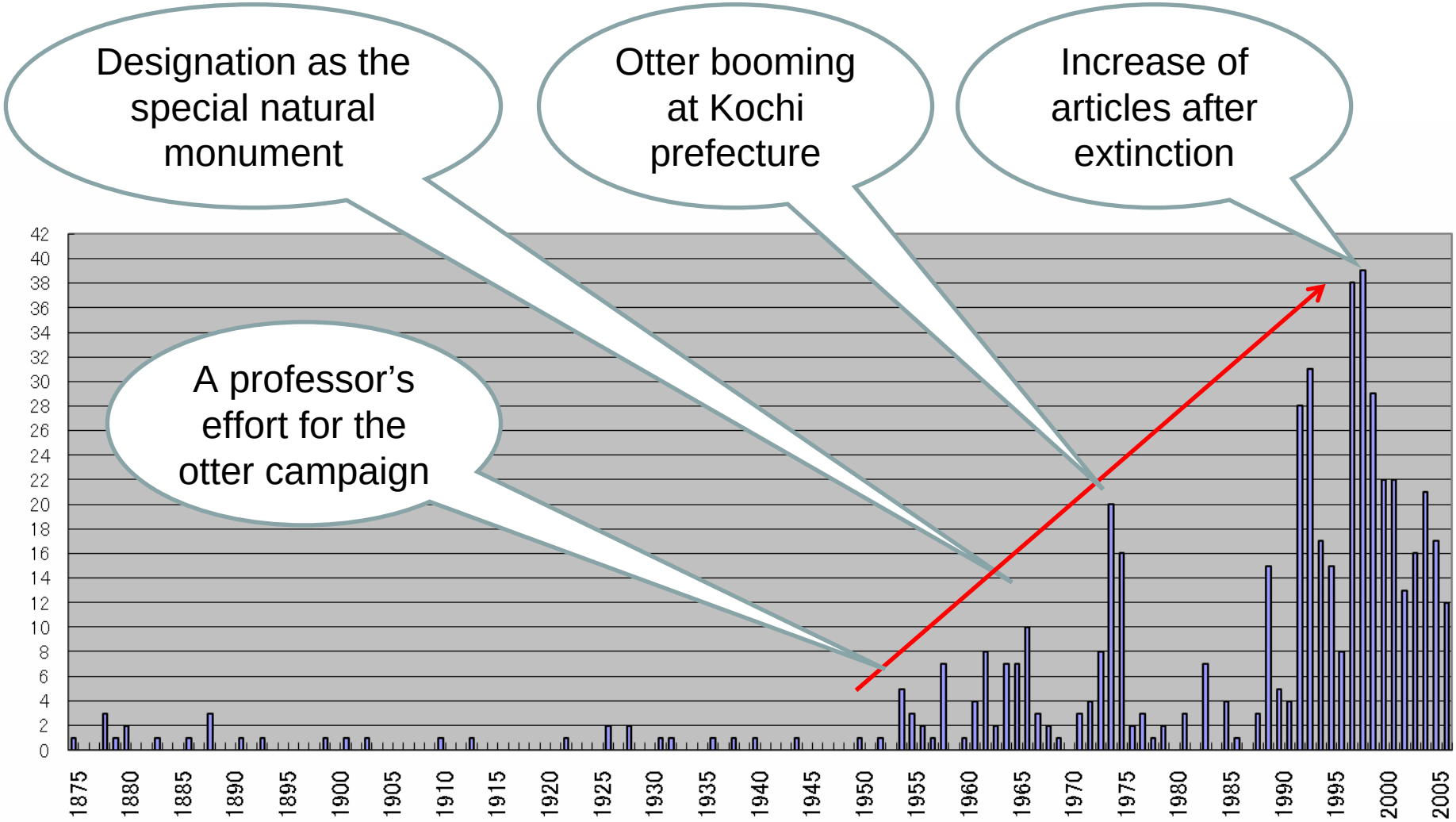


Use of agro-chemicals in Ehime and Kochi prefectures.

Statistical items that might be relevant with the otter loss

Relevant	Agrochemical, River/coast improvement, Fish catch, Road length
Non-relevant	Human population


25 Years
Last chance for capturing plural umber ?
Last Capture
15 Years
Actual Extinction
Ehime pref.
Kochi pref.
Tokushima pref.
Increase of resident awareness
Decrease of actual population exceeding awareness increase
Number of reported mortality
15
10
5
0
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
Number of otter mortality reports in Shikoku Island



Number of newspaper articles on the Japanese otter

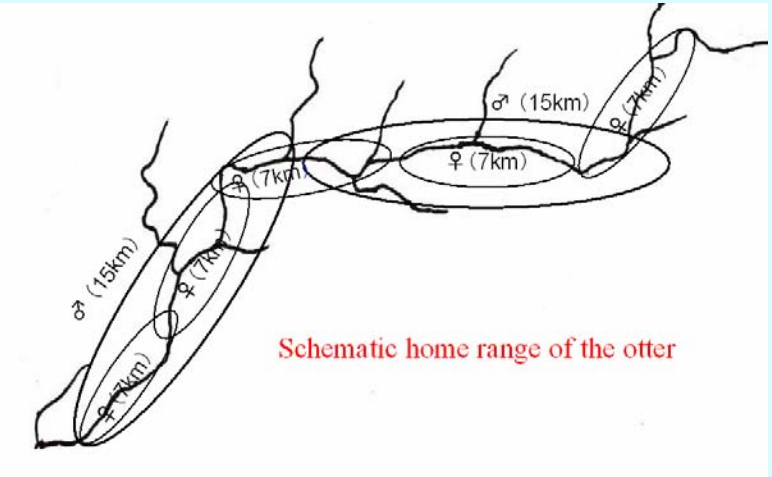
Lesson 3: Media could not serve as early warning.

Lesson 4:

Otter ecology was improperly understood.

Example 1: Otters were thought to be river animal although their last habitat was coastal areas.

Example 2: Protected areas were too small although otters need long home ranges.



Too small protected areas.

Lesson 5: Research was misunderstood as a measure for conservation.

Survey of otter field signs has long been continued since 1978. But positive conservation measures were not taken.

Lesson 6: Conflicts among conservation sectors resulted in narrow-sighted actions during the crucial period （1965-1975）.

For example:

Amateur photographers vs Local otter lovers

Local researchers vs Outside researchers

Local NGOs vs Local governments

(Note: These were not conservation-development issues)

Lesson 7: Views of the fishery sector who suffered from the otter were not considered.

Mortality of the Japanese otter during 1945-1983

Drowned by gill net	31%
Death after capture	19%
Beat to death	11%
Road kill	7%
Unidentified causes	30%
Others	2%
Total (126 cases)	100 %

カワウソの放し飼いを試みた御荘町

Lesson 8: Political issues

e.g. Captive breeding was permitted to an inexperienced local fishery boss instead of an experienced local zoo.

Thanks to extinct Japanese otters for giving us lessons.