BOOK OF ABSTRACTS

II INTERNATIONAL HUCHO SYMPOSIUM
Species of the genus *Hucho* Günther, 1866: population status, conservation, biology, ecology, genetics and culture

University of Wrocław, Wrocław

Inland Fisheries Institute, Olsztyn

Polish Angling Association, Warszawa

September 19-22, 2012

Łopuszna, Poland

Editors:
Andrzej Witkowski, Jan Kotusz, Krzysztof Goryczko, Beata M. Pokryszko, Jan Kusznierz

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Abstracts are not reviewed.

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Species of the genus *Hucho* Günther, 1866: population status, conservation, biology, ecology, genetics and culture

Łopuszna, Poland - September 19-22, 2012

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Pro memoria

Dr. Juraj Holčik (1934-2010) our dear friend, great ichthyologist, Huchen's enthusiast and defender,

Friends

II INTERNATIONAL HUCHO SYMPOSIUM

Species of the genus Hucho Günther, 1866: population status, conservation, biology, ecology, genetics and culture

19th-22th September 2012, Łopuszna, Poland

Dear Friends, Dear Colleagues,

On behalf of the Organising Committee, we would like to thank you all for coming to Łopuszna, Poland and for deciding to partake in **II International Hucho Symposium "*Species of the genus Hucho Günther, 1866: population status, conservation, biology, ecology, genetics and culture*"**

Species of the genus Hucho are the largest resident salmonids. Specimens of the European Huchen (*H. hucho hucho*) of 50 kg, and of the Siberian Taimen (*H. h. taimen*) of 100 kg were still not uncommon at half of the 19th and the beginning of the 20th c. The large size of the fish resulted in a strong poaching and fishing pressure. Also late sexual maturation makes populations of the genus *Hucho* little resistant to exploitation. On the other hand, the main threats result from river fragmentation and canalisation caused by hydrotechnical objects (dam reservoirs, weirs, high thresholds), rapid water discharge from dam lakes, gravel or sand quarrying in river beds, deforestration of catchment areas leading to decrease in water retention, increased water pollution with industrial and communal waste, discharge of floatation waters (mainly gold mines in Siberia) or drastic decrease in abundance of fish species which constitute the Huchen's food basis. Besides, many regions of the fish's occurrence lack legal regulations and their implementation which would enable a limited but rational management of the Huchen species. These factors, acting separately or combined, have resulted in extinction or near-extinction of the members of the genus in many rivers within the natural distribution range. For these reasons the species of *Hucho* have been clas-

sified as most endangered, both locally and globally [Witkowski et al. 2003. *Carpathian List of Endangered Species*. WWF, INC-PAS Vienna-Krakow; Соколов В.Е. (Ред.) 1994. *Редкие и исчезющие животные. Рыбы*. Москва. "Высшая Школа"; Freyhof J., Brooks E. 2011 – *European Red List of Freshwater Fishes*. Luxembourg, Publ. Office European Union]. In this context the situation of the Danube Huchen, which is threatened by extinction in the rivers of the Danube catchment area, is especially critical [Witkowski 1993, Holčik 1995]. At present it occupies less than 40% of its original distribution range [Holčik 1990]. The critical situation of *H. hucho hucho* was confirmed during the **International Symposium *„Schutz und Erhaltung der Huchenbestände"* held in Lindbergműhle, Germany, 4th -7th September 1988** [Harsányi 1994]. The first real symposium devoted to the Huchen ***"The Contemporary State, Protection and Perspective of the Danube salmon (Hucho hucho L.) in Slovakia (Czechoslovakia) and Central Europe"* was organised by the Slovak Angling Association in Žilina, Slovakia, 27th February 1973** [Randik (ed.) 1976]. The situation of *H. h. taimen* and *Hucho* (*Parahucho*) *perryi* is similar. The Siberian Taimen and Sakhalin Taimen are also highly endangered, as confirmed by the last **Taimen Research Symposium and Conservation Workshop - *"Conserving the largest salmon in the world"* held in Auckland, New Zealand, 9th -10th December 2011.** Probably the situation of the Korean Taimen (*Hucho ishikawae*) and Sichuan Taimen (*Hucho bleekeri*) is no better, but the information on these species is very scanty, mainly because of their limited distribution (China, prov. Sichuan and borderline North Korea-China).

Our aim as the organisers of this Symposium was to invite the leading representatives of all the countries and regions in which species of *Hucho* occur. This is why we have here a great number of scientists and practicing ichthyologists (70) from 20 countries, who are not indifferent to the fate of these beautiful fish. We hope that the lectures and posters presented here, as well as the results of the discussions, will bring new solutions and ideas that will contribute to saving the magnificent fish for the future generations.

We wish you all successful sessions and discussions in the beautiful region of Poland, in the place (Łopuszna Fish Farm - Polish Angling Association) which means so much for preserving *Hucho hucho* on the list of the ichthyofauna of Poland.

Andrzej Witkowski & Krzysztof Goryczko

Łopuszna 19th-23th September 2012

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Vasil'eva E. (Russia)	*The ichthyofauna of the largest rivers of the northern coast of the Black Sea: the recent scope*
Rand P. (USA)	*Assessing status of Hucho and Parahucho using IUCN categories and criteria and prioritizing conservation action*
Łopatka W. (Poland)	*Twenty years in Her Majesty's service - 20th Anniversary Cracovia Huchen Angling Club*
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19th-22th September 2012, Łopuszna, Poland

GENERAL PROGRAMME

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20.09.2012 / Thursday	7:15-8:30 Breakfast 8:00-9:00 Registration 9:00-9:15 Opening Ceremony 9:15-10:35 Conference Session I (80') *Invited lectures* 10:35-10:50 Questions & Answers 10:50-11:10 Coffee break 11:10-11:55 Conference Session II (45') *Phyleography, population gentics & evolution* 11:55-12:10 Coffee break 12:25-14:10 Conference Session III (105') *Farming, life history, reproduction* 14:10-14:25 Questions & Answers 14:25 Lunch 15:30-17:00 Huchen Farm at Łopuszna (visit) 17:45-19:15 Poster Session IV 19:30 Conference banquet
21.09.2012 / Friday	7:00-8:30 Breakfast 9:00-10:00 Conference Session V (60') *Status & conservation - H. taimen, Parahucho perryi* 10:00-10:10 Coffee break 10:10-11:25 Conference Session VI (75') *Status & conservation – H. hucho* 11:25-11:40 Questions & Answers 11:40-12:20 Lunch 12:20-17:00 Excursion/ Rafting on the Dunajec R. 17:30-21:00 20th Anniversary ot the Hucho Angling Club – Pieniny National Park (Sromowce Niźne) – Hotel "*Nad Przełomem*"
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PROGRAMME

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17^{00}-18^{00}		
19^{00}-20^{00}		**Supper**
Thursday 20.09.2012		**Breakfast**
7^{15}-8^{30}		**Registration**
8^{00} -9^{00}		**OPENING CEREMONY**
9^{00} -9^{15}		
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9^{15}-9^{35}	**Vasil'eva E**. (Russia)	*The ichthyofauna of the largest rivers of the northern coast of the Black Sea: the recent scope*
9^{35}-9^{55}	**Rand P.** (USA)	*Assessing status of Hucho and Parahucho using IUCN categories and criteria and prioritizing conservation action*
10^{15}-10^{35}	**Łopatka W**. (Poland)	*Twenty years in Her Majesty's service - 20th Anniversary of the Cracovia Huchen Angling Club*
10^{35}-10^{50}		**Questions & Answers**
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11^{25}-11^{40}	**Weiss S.** (Austria)	*Genetic relationships and phylogeographic structure of Hucho hucho, Hucho taimen and Parahucho perryi with special notes on the protection of the Mur River Huchen in Austria*
11^{40}-11^{55}	**Szulc J., Tański A., Kwiatkowski P., Witkowski A., Formicki K.** (Poland)	*The effect of static magnetic field on the Danube Salmon, Hucho hucho (L.), sperm motility parameters*
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12^{40}-12^{55}	**Bajić A., Sipos S., Pejčić Lj., Srećković I., Demény F., Sokoray-Varga S., Müller T., Miljanović B.** (Serbia)	*Rearing and growth of the Danube Salmon, Hucho hucho (L.) in controlled environment during early juvenile stages*
12^{55}-13^{10}	**Andreji J., Stràňai I**. (Slovakia)	*Growth parametres of the Danube Salmon (Hucho hucho Linnaeus, 1758) under natural and farm conditions*
13^{10}-13^{25}	**Makeyev S.**, **Makeyeva L.** (Russia)	*The Sakhalin Taimen (Parahucho perryi) hatchery reproduction experience on Sakhalin*
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13^{40}-13^{55}	**Šubjak J.** (Slovakia)	*The food of the Danube Salmon (Hucho hucho) in Slovak rivers*
13^{55}-14^{10}	**Yin J., Kuang Y., Tong G., Xu W.** (China)	*Artificial breeding technology of Hucho taimen in China*
14^{10}-14^{25}		**Questions & Answers**
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9^{15}-9^{30}	**Slowik J., Dgebuadze Y., Mendsaikhan B.** (Germany-Russia-Mongolia)	*Conservation status and Conservation Action Plans for the Mongolian Taimen, Hucho taimen (Pallas, 1773)*
9^{30}-9^{45}	**Makeyev S.** (Russia)	*Regional conservation strategy of the Sakhalin Taimen (Parahucho perryi)*
9^{45}-10^{00}	**Vasil'eva E.** (Russia)	*The recent state and presumed future of Hucho and Parahucho species in Russia*
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10^{25}-10^{40}	**Treer** T. (Croatia)	*The Huchen (Hucho hucho) in Croatia – past and present*
10^{40}-10^{55}	**Ivanc M.** (Slovenia)	*The Danube Salmon - Hucho hucho (Linnaeus, 1758) in Slovenia: distribution, threats, conservation*
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8^{45}-9^{00}	**Ratschan C.** (Austria)	*Maximum size and distribution limits of the Danube Salmon (Hucho hucho) as a function of the river size and geology in Austria and Bavaria*
9^{00}-9^{15}	**Hanel L., Andreska J., Lusk S.** (Czech Republic)	*The Huchen (Hucho hucho) in the Czech Republic – history and the present state*
9^{45}-10^{00}	**Hegediš A., Marić S., Nikčević M., Mićković B.** (Serbia)	*The Huchen (Hucho hucho) in Serbia: population status and conservation measures in the last three decades.*
10^{00}-10^{15}	**Sipos S., Bajić A., Pejčić Lj., Srećkovič I., Demény F., Sokoray-Varga S., Müller T., Miljanović B**. (Serbia)	*Conservation programme of the Danube Salmon, Hucho hucho (Linnaeus, 1758) in Serbia - propagation and rearing experiences*
10^{15}-10^{30}		**Coffee break**

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		(Hucho hucho)
		LUSIONS

10^{30}-10^{45}	**Kot M.** (Poland)	*The problems of the management of the population of Hucho hucho protected ex situ in the Dunajec basin by the Polish Angling Associaton*
10^{45}-11^{00}	**Goryczko K., Witkowski A., Kowalewski M.**, **Grudniewska J.** (Poland)	*The strange story of the Huchen (Hucho hucho) in Poland*
11^{00}-11^{15}	**Koščo J.** (Slovakia)	*God save the Queen*
10^{15}-12^{00}	**Goryczko K.** (PL), **Harsanyi A.** (GER), **Kośćo J.** (SK), **Kotusz J.** (PL), **Marić S.** (SER), **Wroblewski M.** (USA)	**SUMMING UP & CONCLUSIONS**
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12^{30}		GOODBYE

ABSTRACTS

(POSTER)

THE ESTABLISHMENT OF MONITORING PROCEDURES TO ENSURE ADEQUATE CONSERVATION OF THE ENDANGERED SALMONID SAKHALIN TAIMEN (*PARAHUCHO PERRYI)* IN HOKKAIDO, JAPAN

AKIBA KENJI, KANEAKI EDO, HIROTAKE OOMIYA and MITSURU KAWAHARA

Japanese Huchen Ecological Research and Conservation Network, Tokiwa, Hokkaido, Japan

The Sakhalin Taimen, part of the salmonid family, is a top predator in the river ecosystem of Hokkaido. It is listed as a rare species. The IUCN listed this species as critically endangered in 2006. Its rarity can be attributed to a combination of factors, including loss of native habitat, capture through recreational fishing, and industrial fisheries bycatch. Due to these pressures, the species is considered to be close to extinction. Despite the risk of extinction, there is currently no law determining the management or conservation of the Sakhalin Taimen in Japan although in certain small restricted areas, the species is subject to some regulations. The lack of adequate legislation hinders conservation and management efforts for the Sakhalin Taimen.

At the Japanese Huchen Ecological Research and Conservation network, we tried to determine the population size of the Sakhalin Taimen. This was conducted through counting the number of spawning beds in each river system over a 15 year period. Due to this work, as of 2012, the habitat situation of the Sakhalin Taimen is largely known (except some basins). While counting the number of spawning beds in each river system and identifying long term trends is necessary, the appropriate approach to understanding such population trends and dynamics has yet to be established. It is important to establish an adequate approach to data analysis in order to establish an effective management system.

To establish conservation and management plans, long term field data (which we have collected since 1997) need to be organised in a usable format. Because of this, we started organising field data through using GIS (Geographical Information System). Based on these data, we are working on a research manual, which describes considerations at the time of research, along with photos related to these data. Currently an inventory of 13 riverine systems with 123 branches is being created.

While the format of the GIS database and the inventory will be continually improved, we plan to periodically add new data (confirmed spawning beds etc.). This will further enable us to identify long term trends in the number of spawning beds, as well as changes in the river environment. The combination of the research manual and GIS database will hopefully provide a system which could readily offer up to date information which will be of use in future field surveys.

(ORAL)

GROWTH PARAMETRES OF THE DANUBE SALMON (*HUCHO HUCHO* LINNAEUS, 1758) UNDER NATURAL AND FARM CONDITIONS

JAROSLAV ANDREJI and IVAN STRÁŇAI

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The aim of this study was to determine the age and growth parameters of the Danube Salmon (*Hucho hucho*) samples collected from the Dunajec River and the farm of Príbovce. In all, 26 individuals were analysed, aged 5+ to 24+. The length-weight relation was calculated from transformed regression equations as well as from the von Bertalanffy growth model. For the Dunajec River the equations were: log w = – 5.665392 + 3.256319 * log l; log l = 1.739815 + 0.307095 * log w; $L_{(t)}$ = 1451.4 *[1 – $exp^{(0.1093 * (t + 0.1251)}$], and for the Príbovce farm - log w = – 7.176307 + 3.773629 * log l; log l = 1.901699 + 0.264997 * log w; $L_{(t)}$ = 1394.1 *[1 – $exp^{(0. 0997 * (t + 0.1249)}$]. Fulton´s condition coefficient for the Dunajec River fish and the Príbovce farm fish was 1.24 and 1.35, respectively. Back-calculated length-weight growth for individual years was higher for the Dunajec River, but in general, the growth of both the Danube Salmon groups showed positive allometric growth.

(ORAL)

REARING AND GROWTH OF THE DANUBE SALMON, *HUCHO HUCHO* (L.) IN CONTROLLED ENVIRONMENT DURING EARLY JUVENILE STAGES

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In this paper we compared two groups of the Danube Salmon (*Hucho hucho*) fingerlings from artificial propagation conducted in April 2011 on a fish farm "Perućac" in Perućac Serbia. The first group was fed with a combination of *Artemia salina*/ commercial trout food, the other group was fed with a combination of *Gammarus* sp./fish meat. During the research period 22.06-14.09 2011 the length and weight

growth was monitored. The group fed with *Gammarus* sp./fish meat had statistically higher values of average mass and length. The specific growth rate (SGR) was by 39.06% higher in the group on the diet of *Gammarus* sp./fish meat. The common trout diet (without addition of *Artemia salina* nauplius) had an effect on the mass of fingerlings which was on average 0.846 g. The condition factor in the group fed with the combination *Gammarus* sp./fish meat was by 15.55% higher, compared to the group fed with the combination *Artemia salina*/fish meat. The less positive correlation between the mass and total length and the greater coefficient of variation show that the growth was more unstable in the group fed with *Artemia salina*/ commercial trout food combination.

(POSTER)

SOCIAL MARKETING CAMPAIGN ON THE TAIMEN CONSERVATION ALONG THE ONON RIVER, MONGOLIA, WITH THE SLOGAN "SET OUR TAIMEN FREE!"

GANKHUYAG BALBAR

WWF Mongolia Programme Office, Ulaanbaatar, Mongolia

Site: The Onon River, Mongolia,
Onon is the headwater of the Amur
One of the last strongholds for the Taimen
6 towns, 17 000 people
Target Audience: Local fishermen
Strategy: Our campaign will protect the Taimen in the Onon River through working with local fishermen to adopt catch-and-release fishing practices in order to reduce illegal fishing
Conservation Result Goal:
By 2017, there will be a 10% increase in adult Taimen in the Onon River
Theory of Change Results:
Knowledge
48.2% of fishermen answered "know laws and fines/penalties accurately" to the question "Are you aware of any laws on fishing in the Onon?" Knowledge increased by 40%
Attitude
92.7% of fishermen strongly agreed with the statement "Taimen should always be put back into the river after it is caught". Attitude increased by 56.2%
Interpersonal Communication
87.3% of fishermen checked the box "Have talked to someone" to the question "Have you talked to anyone about releasing Taimen back into the river instead of keeping it?" IC increased by 75%
Barrier Removal

1. 6 fishing clubs established
2. 25 CMAs established along the river

Behaviour Change

1. Resulted in 250 Taimen being caught and released safely with pictures to prove it.
2. 76.9% of local fishermen answered "take a catch-and-release picture with camera" and no one answered "keep dried Taimen head to take home"

Threat Reduction

In 2010, in the Onon a total of 5 instances of illegal fishing were reported by all Soum inspectors and Park rangers

Conservation Result

In 2010 the Taimen population increased by 48.7% than 2008. (P. Tsogtsaikhan)

Where are your target audiences on the Theory of Change after the campaign?

K + A + IC + BR BC TR CR

(POSTER)

CURRENT STATUS AND MORPHOLOGICAL CHARACTERISTICS OF THE TAIMEN (*HUCHO TAIMEN*) IN SIBERIAN WATERS

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The distribution area of the Taimen – *Hucho taimen* (Pallas, 1773) is limited in the west by the Pechora River, in the east – by the Yana River. The main range of the Taimen in Siberia is composed of catchment areas of three large Asian rivers: Ob, Yenisei and Lena. At the same time the Taimen is found in the rivers discharging into the Northern Ice Ocean (Ob and Tazov estuaries, Karsk Sea and Laptev Sea) such as Taz, Pyasina, Khatanga, Anabar, Olenyok, Omoloy and Yana. However, the Taimen does not occur in such rivers as the Nadym, Pur or Lower and Upper Taymyra.

At present two factors determine the presence of the Taimen in the freshwater ecosystems of Siberia. One is the habitat suitable for a rheophile, the other - considerably increasing in significance in recent years – intensive fishing: commercial, angling and poaching. The Taimen has always been valued by anglers, but today, in many regions, often immature and small specimens are caught. In many regions of Siberia the Taimen's abundance has decreased so much that the species has been included in local Red Books or has become a candidate for the status, but this does not prevent its further decimation.

Despite the great interest of specialists, the knowledge of the species is mainly limited to publications dating from the beginning and the middle of the 20th century. However, even here most data are limited by the small sample size. The existing morphological material has provided sufficient data to raise the question of identity of *Hucho hucho* and *Hucho taimen*, which would suggest that the Taimen should be regarded as not more than a subspecies of the Danube Salmon.

It was observed that the Baikal, Angara, Yenisey and, possibly, Ob Taimen were characterised by a smaller number of transverse rows of scales, compared to the Taimen from the lower Lena River. The number of scales in the lateral line is correlated with the number of transverse scale rows. Recent publications on the Taimen from the rivers Anabar and Yana confirm the presence of small-scaled (many-scaled) Taimen, with the mean number of scales in the lateral line equal to or exceeding 200.

At the same time, Ob and often Yenisey Taimen usually have a considerably smaller number of scales in the lateral line. Similar values were obtained for the Taimen from the rivers which have their sources in the Urals (Khulga, Northern Sosva).

Based on one of the meristic characters – number of scales in the lateral line – the Taimen inhabiting Siberian rivers forms small- and large-scaled populations. In some catchment areas (e.g. rivers Khantaika, Khatanga) both forms co-occur.

(ORAL)

DISTRIBUTION, STATUS, RESEARCH AND RESEARCH OPPORTUNITIES OF THE DANUBE SALMON (*HUCHO HUCHO*) IN HUNGARY

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Hucho hucho is listed by the International Union for Conservation of Nature (IUCN) as a critically endangered species. In Hungary, there are 100 fish species out of which 32 are protected and 7 (including *H. hucho*) are strictly protected. The Danube Salmon being an endemic species, its conservation value is 100.000 HUF/individual (350 Euro/ind.). Despite the occasional observations of *H. hucho*, the species is only found in the upper sections of the Hungarian rivers (Tisza, Danube, Dráva). Our aim is to propagate, rear and introduce *H. hucho* in order to maintain the Hungarian natural stock. It is very difficult to get suitable broodstock for propagation from Hungary. For this reason, it would be important to obtain adult fish from abroad. One possible way is to import them from Serbia.

Collaboration between the University of Novi Sad and the Szent István University offered a possibility to work with this fish species in a trout farm at Peručac, Drina River, Serbia between 2011 and 2012. Propagation and rearing of *H. hucho* were successful, and several hundred juveniles were released into the original site of the broodstock. If this collaboration continues and is successful in the future, there will be a chance to transport some juveniles to Hungary as well.

Results from other fields of research, and data from earlier works of the Szent István University can be used for the Danube Salmon research: sperm cryopreservation

for gene bank (e.g. conservation and ex situ protection of *Salmo trutta marmoratus* or successful fertilisation tests among *Anguilla* species) and population genetics (*Cyprinus carpio, Sander lucioperca, Acipenseridae*). We hope that we can work together with other institutions in order to strengthen the Hungarian and other Danube Salmon populations.

(ORAL)

GENETIC POPULATION STRUCTURE OF THE ENDANGERED SALMONID, SAKHALIN TAIMEN *PARAHUCHO PERRYI* IN JAPAN: IMPLICATIONS FOR CONSERVATION

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To describe in detail the population genetic structure of the endangered salmonid, Sakhalin Taimen *Parahucho perryi* in Japan, 350 individuals collected from 14 populations were subject to analysis of eight polymorphic microsatellite loci. Exact tests and genetic differentiation (F_{ST}) revealed that genetic divergence among the populations was high (Global $F_{ST} = 0.218$). Significant correlation was observed between the genetic differentiation and the geographic distance (Mantel test: $r^2 = 0.403$, $P = 0.001$). Furthermore, eight genetic clusters were identified by model-based Bayesian clustering approach implemented in STRUCTURE. These results imply that the Sakhalin Taimen could be subdivided even between neighbouring rivers (<10 km) and/or between tributaries within a river and that gene flow is likely to occur only between neighbouring populations. Genetic diversity within each population was low (allelic richness = 1.9–2.6, average heterozygosity = 0.27–0.45), especially in populations that are located in the Sea of Japan and the Sea of Okhotsk region. From conservation perspective, each population should be treated as a separate management unit because of the strong differentiation and the unique genetic diversity.

(POSTER)

HUCHO, PARAHUCHO AND PHYLOGENY OF THEIR BEHAVIOUR

MANU ESTEVE

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A remote underwater video system was used to study and describe for the first time the mating behaviour of the Siberian Taimen (*Hucho taimen*), Danube Huchen

(*Hucho hucho*) and Sakhalin Taimen (*Parahucho perryi*). Recordings took place in the wild in Mongolia, Japan and Austria, during the spring of 2006, 2007 and 2011, respectively. The results were compared with the mating behaviour of salmonines belonging to other genera. The Danube Huchen and Siberian Taimen females, after the spawning act, rest for a variable number of minutes (3-6) before covering the eggs by beats of their tails. They share this habit only with the Manchurian Trout of the genus *Brachymystax*. The Sakhalin Taimen, on the contrary, cover their eggs inmediately after spawning – a behaviour shared with species of the genera *Oncorhynchus* and *Salmo*.

(ORAL)

CONSERVATION GENETICS OF THE EUROPEAN HUCHEN *(HUCHO HUCHO)*: IMPLICATIONS FOR THE MANAGEMENT OF WILD AND HATCHERY POPULATIONS

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Information on the genetic population structure of the European Huchen (*Hucho hucho*) can be important both for the conservation management of wild stocks, and for captive breeding and aquaculture. This study investigated the genetic diversity and differentiation of eight wild and four hatchery populations of the Huchen from the upper Danube system, based on microsatellite markers which were successfully developed from transfer experiments with related fish species. The original hypotheses (i) that most populations would share one common gene pool and (ii) that all investigated wild populations would be strongly affected by stocking with hatchery fishes, were rejected. Analyses based on individual genotypes identified eight different genetic clusters with a moderate to substantial degree of differentiation. Each cluster contained specimens from two to ten different source populations and a percentage of 9-100% of specimens from hatchery stocks. These results indicate that effective conservation genetic approaches to sustain the species´ genetic and evolutionary potential need to consider both hatchery and wild populations. They also show that cluster-based conservation approaches are advantageous compared to population-based approaches.

(ORAL)

THE STRANGE STORY OF THE HUCHEN (*HUCHO HUCHO*) IN POLAND

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The natural range of the Huchen in post-war Poland was limited to the upper parts of two small river systems - Czadeczka and Czarna Orawa, tributaries of the Kysuca and Orava Rivers, forming a part of the Vah River system. The programme of fingerlings production in the Łopuszna hatchery for stocking the Czarna Orawa drainage system was launched by the Slovak and Polish Angling Associations in the early 1960s. The eggs were obtained from wild spawners caught in the Czarna Orawa and in its Polish tributaries [*Kołder W. 1964. The ichthyofauna of the Czarna Orawa river system. Wiad. Wędk., 9(183) 10-11*]. The project was moderately successful and was abandoned when the Orava Dam obstructed the access of the fish to their spawning grounds in Poland. Attempts to breed the Huchen and build up its farmed broodstock were continued in the Łopuszna hatchery, based on wild fish from the Dunajec River. The wild stock of the Huchen in that river resulted from an unofficial introduction by the Slovak Fishery Organisation into the Dunajec and Poprad (borderline rivers between Poland and Slovakia) during the 1940s or 1950s [*Witkowski et al. 2007. Huchen (Hucho hucho) - success of the Polish ichthyology. Kom. Ryb., 3: 17-22*]. It is noteworthy that these rivers, being the Vistula tributaries, were the main spawning grounds for a very prosperous Sea Trout population until the building of the dam on the Dunajec (1941) which considerably limited the spawning migrations, and on the lower Vistula in Włocławek (1968) which totally prevented access to the historic spawning grounds. This adversity paradoxically created a niche for another trophy salmonid – the Huchen. The increasing angling pressure on this new and highly appreciated fish endangered its existence and encouraged attempts to build up a farmed broodstock as the basis of a rational stocking programme [*Witkowski A. 2012. The Huchen short story in our waters. Sztuka Łowienia, 1 (12):12-15*]

Due to the Slovak experience [*Ivaška S. 1950*] and M. Kowalewski's persistent and patient work, at the end of the 1970s the Łopuszna Fishery Station had about 150 broodfish fed mainly with minced fish, beef spleen, vitamins and binder. This enabled the annual production of 200 thousand of fry, and 50 thousand of autumn fingerlings for stocking of the Dunajec and Poprad. The surplus of fry was very effectively used for stocking the San (another Carpathian Vistula tributary). Originally, this river never abounded with salmonids, having only isolated Brown Trout populations in its upper part and tributaries. After construction of the Solina Dam, with its reservoir of 70 m depth, the cool tail water with relatively constant temperature created excellent conditions for introduction of the Grayling and Huchen. Today the San below the dams in Solina and Myczkowce is the most popular Polish fly fishing ground for the Grayling and Brown Trout; it also holds a fairly abundant Huchen population.

Kowalewski's success spurred his colleagues to test their skill in farming of the new species. As a result, in the 1970s the Huchen was farmed also in other Polish Angling Associaton (PAA) farms: Rumia, Czarci Jar, Zawoja, and at the Salmonid Research Laboratory of the Inland Fisheries Institute in Rutki. A system of dry (pellet) feeding of the Huchen during its whole life cycle was devised and successfully used [*Goryczko K. 1993. How we are attempting to preserve endangered salmonid species in Poland. Fortsch. Fisch. Wiss., 11: 39-41*]. The stocking material produced in Rutki was released to the Gwda River (Pomeranian secondary tributary of the Odra) during 7 years [*Andrzejewski W. 2000. Results of an attempt to introduce of the Danube salmon, Hucho hucho (L.) into the River Gwda and its tributaries (NW Poland). Acta Hydrobiol., 42: 85-93*]. In 1955-2011 the PAA released 13.6 million feeding fry, 4.6 million autumn fingerlings and ca. 50 thousand older assortments (1^+ to 5^+) in the Polish rivers. In recent years the Huchen fry production in Poland is ca. 1 million per year.

It is noteworthy that after the preliminary success of the project (information on observed natural spawning, photographs of trophy fish) there is no further proof of existence of a self-sustaining population of the Huchen in the Gwda. Similar observations on the failure of Huchen introduction after termination of following stocking have been published by Holčik [*Holčik J. 1984. Review and experiments with introduction and acclimatization of the huchen, Hucho hucho (Linnaeus,1758)(Salmonidae). EIFAC Tech. Pap. 42, Suppl. 2: 290-298*].

As the interest in the Huchen on the part of the Polish Angling Association VIPs gradually faded, the care for its existence was delegated to relatively small local anglers' organisations, the funds for stocking diminished, and the ambitious fish farmers got only moral satisfaction. Under the circumstances, the Nowy Sącz Branch of PAA as the managing body of the Łopuszna Fishery Station, M. Kowalewski and his successor at the farm M. Krzyś are now the only professional safeguard of the Huchen's existence in Poland. A very active anglers' club Głowatka (Huchen's Polish nickname) is another hope. During the twenty years of its activity the club supported economically, physically and by public relations the idea of the Huchen [*Łopatka W. 2012. Twenty years in the queen's service… . Sztuka Łowienia, 1(12):70-73*] as a precious and integral part of the biocoenosis which is human-transformed but still viable and productive. The support of the Non Bureaucratic Organisation is also vital while trying to counteract the campaign against the Huchen as an alien species, led by some scientists [*Dębowski P. & Mikołajczyk T. 2011. Letters to the Editor. Kom. Ryb., 5: 35*] and applauded by some anglers' press [i.*e. Wędkarski Świat*].

Conclusions:

1. Small native populations of the Huchen in Poland were extinct in the upper Czarna Orawa R. as a result of the Orava Dam construction and in the Czadeczka, because of water pollution and poaching.
2. The Huchen was unofficially introduced into the Dunajec and Poprad after the indigenous Sea Trout extinction, caused by the construction of dams in Czchów, Rożnów and Włocławek.
3. Quick development of specific Huchen farming and effective stocking methods was crucial to rational management of its populations.
4. The Huchen was deliberately introduced into a part of the San River with excellent habitat conditions created by the tail water from the dam lakes Solina and Myczkowce.
5. Rational management of the Huchen populations under heavy angling pressure needs regular and extensive stocking.
6. As a result of 10 years of intensive stocking with feeding fry (50,000/year), several adult Huchen were observed in 2011, in the estuarine parts of the Czarna Orawa, till the Orava Dam.
7. Such management needs adequate and a long-term financing.

(POSTER)

PRELIMINARY ATTEMPTS AT THE HUCHEN (*HUCHO HUCHO*) START FEEDING

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This abbreviated presentation of "historic" activities toward practical solution of Huchen fry start feeding without opportunity of buying a high quality professional feeds (Przybył et al. Podchów głowacicy *Hucho hucho* L. żywionej wyłącznie paszami sztucznymi w warunkach chowu fermowego. Rocz. Akad. Rol. w Poznaniu CCXLVI 77-84.; Madziar et al. 1993. Survival and growth of Danube salmon fry feeding with formula of dry starters In conditions of production breeding. Sci. Ann. PAA, 6: 125-136) is aimed at enthusiasts, non-professionals who would like to take part in active protection of endangered *Hucho* species. At present, high quality starter feeds for salmonids and other fish species are easily obtainable, so we would like to stress the farming technology aspects of the experiments. In both cases the experiments started at the "swim up" stage of fry hatched from eggs obtained from farmed Huchen broodfish. In Łopuszna the fish were reared in plastic troughs, in Rutki in plastic circular tanks with starting stocking rate 13 and 12 fish/ dm^3, respectively. In Łopuszna the experiment lasted 81 days, in Rutki - 76 days. The fish were fed 15-12 times a day at *ad libitum* level. The tanks were cleaned each morning. In both farms the standard prophylactic bath treatments with formaldehyde 1:6000 solution (weekly) or copper sulphate 1:2000 (Łopuszna) and chloramine 10 ppm (monthly; Rutki) were applied. In Łopuszna two experimental dry feeds and a control wet mixture of finely minced beef spleen, herring roe, skimmed milk and yeast were used. In Rutki another two experimental dry feeds and a live zooplankton were used as control. The results are presented in the table.

Results of Huchen fry experimental feeding in two farms (Łopuszna and Rutki)

	Experimental feed 1	Experimental feed 2	Control feed
Łopuszna 1989: 81 days wet feed			
Final mean weight [g]	0.58	0.71	0.63
Survival [%]	48.00	76.40	65.20
Rutki 1992: 76 days live zooplankton			
Final mean weight [g]	2.18	1.86	2.60
Survival [%]	59.90	82.00	40.60
Final biomass [g]	136.20	152.30	105.60

The slower growth rate in Łopuszna compared to Rutki resulted probably from the water temperature ranging from 8 to 16^{0}C (15-20^{0}C in Rutki). Additionally the results suggest that the Huchen has a better tolerance to high water temperature than the Char, Brown Trout and Salmon.

The survival rate ranging from 40.6 to 82% proves that the Rainbow Trout fry and fingerlings rearing technology can be successfully used for the Huchen. However, the real problem can be the aggressive behaviour of young Huchen. It is probably increased when live food (zooplankton, other fish fry) is offered. The phenomenon was observed in the Rutki control group, based on the presence of "two tail" fish, and indirectly on the discrepancy between the recorded and actual final mortality. The highest mean weight combined with the lowest final biomass, observed in this group, probably resulted from the predator-prey natural selection. The young Huchen aggression can be easily controlled by the continuous (automatic feeder) or frequent *ad libitum* feeding. The low stocking rate also seems to stimulate aggression.

(ORAL)

THE HUCHEN (*HUCHO HUCHO*) IN THE CZECH REPUBLIC – THE HISTORY AND THE PRESENT STATE

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The Huchen or Danube Salmon (*Hucho hucho*) is native to the Danube River basin. In the past it was a natural migrant through the Morava and the Dyje/Thaya rivers in Moravia. However, there was a question whether its occurrence really was regular and common there. The last documented catches of individuals belonging to the native populations date from the end of the 19th century (1870, North Moravia, the Morava River, two specimens weighing 5.5 and 10 kg; 1893, South Moravia, the Dyje/Thaya River, a specimen weighing 14 kg).

Deliberate stocking with the Huchen was carried out step-by-step in all three sea-drainage basins situated in Bohemia, Moravia and Silesia. Within the Czech Republic, the fish was released into the Elbe and Odra river basins, which were not the areas of its native occurrence: the intentional stocking started in the 1880s (the Odra River). The Huchen was first stocked in the Morava River basin at the beginning of the 20th century, while the stocking of the Elbe River basin started only in the middle 20th century (the Otava and Vltava rivers).

Local stocking with the Huchen was often associated with the fish introduction to water reservoirs (e. g. Klíčava, Lipno, Morávka, Pastviny, Římov, Vranov and Vrané reservoirs). The Huchen stocking (usually yearlings) in flowing waters occurred only accidentally, often as a result of escapes from hatcheries. Nevertheless, some rivers (e.g. Bečva, Berounka, Dyje/Thaya, Odra, Ohře, Olše, Otava, Moravice, Stěnava, Sázava, Svratka and Vltava) were intentionally stocked with the Huchen.

The Huchen´s natural breeding was only rarely confirmed (e.g. in the Moravice River), but no viable population was established in the Czech Republic. Therefore, its occurrence at particular sites is mostly short-term, of several years duration.

Due to accidental individual catches, it is evident that the Huchen was found only rarely in few flowing waters within Morava, Odra and Labe river basins during the last decades. Based on angling statistics, the rate of Huchen´s return is low and sporadic. The total statistics of the Czech Angling Association show that in 1995-2011 annual catches fluctuated between 1 and 15 specimens. The average weight of the angled specimen was 5.2 kg.

Examples of the biggest angled Huchen from the Czech waters are as follows: Otava River (year of capture 2008, total length 122 cm, weight 15 kg), Vltava River (2000, 102 cm, 12 kg), Svratka River (1996, 98 cm, 8.7 kg), Bystřice Valašská River (1983, 98 cm, 7.2 kg), Vltava River (1976, 91 cm, 9.5 kg).

It can be assumed that the occurrence of the Huchen in the Czech Republic will depend only on artificial reproduction in captivity and on consequent release into open waters in the future.

(ORAL)

HUCHO HUCHO IN BAVARIAN RIVERS: POPULATION DATA AND SPECIES CONSERVATION STRATEGIES FOR THE DANUBE SALMON

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The Danube Salmon *Hucho hucho* is the largest salmonid in Bavaria. It is autochthonous in alpine or prealpine rivers of the Danube system where it occupies the grayling and barbel regions. Its habitats range from creeks, such as the Mitternacher Ohe (mean annual discharge <1 m^3/s) to the voluminous Inn River (mean annual discharge 740 m^3/s). Long-term records indicate that the intact metapopulations of the Danube system had previously been much better interconnected than today.

Although *H. hucho* populations may locally appear satisfying, this is misleading because almost no Bavarian river provides for self-sustainment of this fish without stocking. The main causes are fragmentation and habitat loss due to extensive water regulation including the use of hydropower, in addition to pollution and warming. Stocking programmes have helped to maintain or even reintroduce the Danube Salmon in many of its original habitats.

H. hucho is listed by the European NATURA 2000 directive which prohibits damage to the habitat for this and other species. Conservation programmes have been launched to maintain or reinforce the populations. Current measures include stocking with *H. hucho* and its main prey species, restoration of key habitats like spawning grounds, improvement of longitudinal and lateral migration and reduction of predatory birds. On top of restrictive federal regulations on the fishing for *H. hucho*, most fishing clubs have proactively implemented even tighter rules.

(ORAL)

GEGENWÄRTIGE SITUATION DES HUCHENBESTANDES IN BAYERN

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Mit 143000 Hektar Wasserfläche und über 70000 km Fließgewässer ist Bayern das gewässerreichste Bundesland in Deutschland. Die verantwortungsvolle Nutzung und Hege der Fischbestände und der Erhalt ihrer Lebensräume ist Grundlage der Fischereiausübung. Die Produktion von Satzfischen und die Vermehrung Huchens hat in Bayern eine lange Tradition. Sie ist ausgerichtet auf eine nachhaltige Erzeugung gesunder Besatzfische.

Unter Federführung und Teilfinanzierung des Bayerischen Staatsministeriums für Landwirtschaft und Forsten wurde eine flächendeckende Fischartenkartierung in den Fließgewässern Bayerns durchgeführt. Das Projekt wurde in Zusammenarbeit von den Fachberatungen für das Fischereiwesen der Bezirke und dem Institut für Fischerei in Starnberg durchgeführt, wobei letzteres für die Koordination des Projektes verantwortlich war. In dem Untersuchungszeitraum von knapp 9 Jahren wurde bayernweit in 2.834 repräsentativen Gewässerstrecken (insgesamt 712 km) das Fischarteninventar mit Hilfe der Elektrofischerei qualitativ und quantitativ erhoben, sowie die Qualität der jeweiligen Lebensräume kartiert.

Im Rahmen der Fischartenkartierung konnte festgestellt werden, dass der Rückgang der Huchenbestandes in Bayern heutzutage nicht mehr auf die Wasserqualität zurück geführt werden kann, weil die Wasserqualität durch gezielte Abwasserentsorgung in seinem Lebensraum wesentlich verbessert werden konnte. Die Ursachen für seine Gefährdung können auf die strukturellen Veränderungen der Gewässer, die Eingriffe in das Strömungs- und Abflussgeschehen sowie die Veränderung der Substratsituation durch gestörte Geschiebedynamik und Erosionsbelastung aus landwirtschaftlich genutzten Flächen sowie die Durchgängigkeit der Gewässersysteme zurückgeführt werden.

Will man die Huchenbestände regenerieren, so muss man unter Berücksichtigung seiner Biotopansprüche alle auf seinen Lebensraum wirkenden negativen Einfluss beseitigen. Ein wesentlicher Faktor, der gegenwärtig im Bezug auf die Wasserrahmenrichtlinie der EU in Bayern nachhaltig verfolgt wird, ist die freie Durchwanderbarkeit der Gewässer für Fische und andere Organismen. Wanderbewegungen des Huchens können je nach der Lage seines Lebensraumes von wenigen hundert Metern bis zu

hunderten von Kilometern annehmen. Sie erfüllen dabei viele für sein Vorkommen ausschlaggebende biologische Funktion. Einige besonders wichtige davon sind die Wanderung zu den Laichplätzen, die Kompensation der Verdriftung und die Erhaltung der genetischen Variabilität der Populationen.

In Bayern beschränkt sich das Vorkommen des Huchens auf das Einzugsgebiet der Donau. Er ist jedoch nicht nur, wie z- B. v. Siebold (1863) schreibt, in der Donau und ihren südlichen Zuflüssen beheimatet, sondern kommt auch in allen montanen und submontanen Seitengewässern vor (Harsányi, 1982; Holčik et al., 1988). Bereits seit 1895 wurde der Huchen in Bayern künstlich aufgezogen und im Donau-Einzugsgebiet regelmäßig besetzt (Weigelt, 1896).

Im Rahmen der Kartierung konnte der Huchen in der Donau, dem Lech, der Ammer und der Isar einschließlich ihrer Nebengewässer sowie in kleineren nördlichen Seitengewässern der Donau nachgewiesen werden. Da insbesondere der ausgewachsene Huchen ein großes Territorium beansprucht, wurde er nur mit einer Individuendichte von maximal zwei Tieren pro 100 m Befischungsstrecke angetroffen. Huchenpopulationen werden vielfach durch Besatz erhalten bzw. neu aufgebaut. Langjährige Beobachtungen des Laichvorgangs in Isar, Loisach, Ammer, Lech und Wertach (Oberbayern) sowie in der Mitternacher Ohe (Niederbayern) belegen hier selbsterhaltende Populationen. Die meisten Huchenvorkommen konnten bei einer Fließgeschwindigkeit bis maximal 60 cm/s angetroffen werden. In strukturreichen Huchenstrecken mit strömungsberuhigten Abschnitten wurden Fließgeschwindigkeiten von maximal 120 cm/s gemessen. Seine Wohngewässer liegen in Bayern auf einer Höhe von 300-800 m ü.N.N. Hier dominierten am Gewässergrund Steine, Kies und Sand. Schlamm wurde nur selten beobachtet.

Der Aktuelle Gefährdungseinschätzung des Huchens kann aus der aktuellen Roten Liste gefährdeter Tiere Bayerns (2003) entnommen werde. Sie dokumentiert den Rückgang des Huchens, so dass seine Gegenwärtigen Vorkommen und die Populationsdichte keinesfalls als Artenschutzerfolg an der Öffentlichkeit präsentiert werden kann. Seine Bestandseinstufung – Gefährdet- ist trotz mancher Erfolge nach wie vor als ein Alarmsignal einzustufen.

(ORAL)

THE HUCHEN (*HUCHO HUCHO*) IN SERBIA: POPULATION STATUS AND CONSERVATION MEASURES IN THE LAST THREE DECADES

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In Serbia, the Huchen (*Hucho hucho*) inhabits the Drina River basin (the most significant rivers are Drina, Lim, Uvac and Vapa as well as Trešnjica, a small right bank tributary of the Drina which is one of the most important spawning areas of this species

in Serbia), as well as some other rivers in the West Morava basin (Ibar, Detinja, Moravica). The Huchen also inhabits some reservoirs in the western part of Serbia (Perućac, Potpeć, Zlatarsko and Sjeničko Lake).

Research on the Huchen in the Serbian waters in the last 30 years was not extensive and mostly focused on the growth characteristics and length-weight relationship in the Drina populations. In addition, there are published data on the feeding of the Huchen fry in the Trešnjica River and genetic characteristics of the regional populations based on mtDNA. Some publications refer to controlled spawning and rearing of the fry for stocking purposes.

Conflicts between recreational fishing on the one hand, and high level of vulnerability for the natural population and conservation needs on the other, are the main characteristics of the fishery exploitation of the Huchen in Serbia. The legislation imposes fishing limitations through the closed season (CS) form March 1 to August 31, the minimal landing size (MLS) of 100 cm and the catch limit of 1 piece per day and 3 pieces per year. On the other hand, for a long time the Huchen had the status of a ”natural rarity“ which excluded any form of fishery use. The practice showed that such a rigorous regime favoured poaching, so in 2010 the Huchen was listed as a “protected wild animal species whose status and protection regime are regulated by the fisheries legislation”. In Serbia in 2005 the “*Action plan for huchen in the fishery waters of the Republic of Serbia“* was adopted which defined the basic goals of the future management and protection of the population:

a) research of the life cycle and population characteristics of the Huchen in Serbia,
b) protection measures for the Huchen habitat,
c) protection measures for the Huchen populations.

Implementation of the action plan is, in the last few years, mostly reduced to the more or less successful attempts at controlled spawning and breeding of stocking fry.

Next to the dam construction and habitat fragmentation, pollution of various kinds and poaching, one of the main problems in protection and sustainable use is related to the fact that the Drina is the border river and that the management measures of the Huchen are different in Serbia and the Republic of Srpska (Bosnia and Herzegovina). For example, the MLS in the Republic of Srpska is 70 cm and CS is from January 1 till May 31, while in Serbia the MLS is 100 cm and the CS is from March 1 to August 31. During the police control of anglers, Huchen of 80-90 cm were still caught in the Republic of Srpska and those caught in January or February were always from Serbia. However, in March 2012, Serbia and the Republic of Srpska signed the ”Agreement of protection measures and sustainable use of huchen population (*Hucho hucho*) in the Drina River”, and it predicts harmonization of all protection measures and common programmes of improvement and sustainable management of the Huchen population in the Drina River.

(ORAL)

THE DANUBE SALMON - *HUCHO HUCHO (LINNAEUS, 1758*) IN SLOVENIA: DISTRIBUTION, THREATS, CONSERVATION

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The distribution of the Danube Salmon (*Hucho hucho (Linnaeus, 1758*)) is closely associated with the Danube River basin. In the past the Danube Salmon was present along 11.126 km of water courses in the Danube River system. Now it has become extinct in 39% of these waters, and in 27.5% it is extreamly rare. Thus the healthy population has been reduced to 33.5% of its original distribution range. Slovenia is no exception. The distribution has become drastically reduced in the Mura and Drava river systems. In the most important river system in Slovenia - the Sava River system – the Danube Salmon is no longer present in some tributaries and in the lower part of the river. Its habitats have become fragmented.

The greatest threat which is reducing the population of the Danube Salmon in Slovenia is the degradation of its natural habitats. Several new hydropower plants are being built on the biggest Slovenian rivers. Pollution from industry, farming and untreated sewage systems are also contributing to the decline of the population of the biggest salmonid fish in Slovenia.

The most important conservation method for preserving a healthy Danube Salmon population is preserving its natural habitats or renaturisation of the degraded ones, strict fishing policy which includes regular stocking with young categories of this fish and limited catch of big fish, allowing the Danube Salmon to spawn several times before it can be caught.

(ORAL)

GOD SAVE THE QUEEN

JAN KOŠČO

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The Huchen occurred naturally mainly in the Vah River and its tributaries (Orava, Kysuca, Revuca, Turiec) and in the Hron River; it was introduced into the Hornad River and Nitra River. Recently, the Huchen was introduced also into rivers of the Baltic Sea basin, into some riverine lakes, but its density and distribution area decreased. In Slovakia the Huchen or the Danube Salmon was studied in detail. The first attempts at its conservation and artificial breeding were made by Ivaska

before the 2nd World War and summarised by him in 1946 and 1951. The Huchen's size is admirable, up to 183 cm in length and 60 kg in weight. Formely, it was found in 2039 km of water courses, at present it is frequent only in 413 km of water courses, rare in 125 km and disappeared from 501 km of water courses. The legal landing size for this species is 70 cm, but most of the caught Huchen are bigger than 1 m. The closed season is from January 1st till October 30th.

(ORAL)

THE PROBLEMS OF THE MANAGEMENT OF THE POPULATION OF *HUCHO HUCHO* PROTECTED EX SITU IN THE DUNAJEC BASIN BY THE POLISH ANGLING ASSOCIATION

MAREK KOT

Polish Anglin Association, Branch Nowy Sącz, Poland

The Nowy Sącz Branch of the Polish Angling Association protects the Huchen in the following ways: stocking (mainly summer fingerlings, occasionally selects), stocking with prey fish species (Nase and Chub), legal protection (minimal landing size 70 cm, closed season March 1st – May 31st, weekly allowable catch 1 fish, minimum size of artificial bait 10 cm from September 1st till January 31st), active protection (guarding spawning grounds, controlling anglers, night control of fishing grounds), monitoring the population through registering catches and through sampling catches from river fragments which hold the Huchen, protection of the habitat through counteracting its changes (illegal gravel exploitation, dam-building on the Dunajec and its tributaries, water pollution, illegal canalisation of river beds). C&R and limiting angling methods to dry fly on barbless hooks are in force on an over 10 km section of the Dunajec between Krościenko and Ochotnica (Special Section). Despite these efforts, the number of registered catches has been drastically decreasing in recent years. At the same time, some anglers who are not interested in Huchen fishing express an opinion that the Huchen is too abundant in our fishing grounds. Maintaining a large basic stock of the Huchen and managing its population are very costly and not covered by the income from angling licences. The costs are mainly met by the Branch; the Club Głowatka from Kraków participates in financing a part of the stocking. Searching for additional sources of financing, the Branch considered the possibility of creating a special Huchen fishing ground, using overgrown spawners from the breeding stock in Łopuszna, but the planned localisation – dam lake in Sromowce – was rejected following ichthyological expertise and water quality assessment, because of the small numbers of potential prey, too low oxygenation (discharge of bottom water from the Czorsztyn dam lake) and large fluctuations of water level. The concept of creating such a fishing ground is now at the stage of selecting an adequate water body. In order to maintain the breeding stock it is necessary to find an additional source of

funds, since the breeding is a form of protection of the species in situ in the Czarna Orawa system and ex situ in the Dunajec system. It is also necessary to revise the existing form of stocking and of making the fish available to anglers.

(ORAL)

THE DANUBE SALMON – *HUCHO HUCHO* (LINNAEUS, 1758) IN SLOVAKIA (PROTECTION, BREEDING AND FISHING)

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The Danube Salmon is a typical endemic species of Slovak ichthyofauna, with the exception of the rivers Dunajec and Poprad. Its presence has been confirmed in 6 rivers: Vah, Hron, Orava, Turiec, Poprad and Dunajec. The Danube Salmon population in the Slovak waters is restocked with material from fish farms (where mature fish are kept for artificial breeding). The fishing season for the Danube Salmon is November and December, and special fishing permit is required. Special arrangements apply to the borderline rivers with Poland: Dunajec and Poprad. The annual catches (fish appropriated) in recent years reached about 100 fish. The average weight of one fish is around 9 kg. Although the Danube Salmon in Slovakia is legally protected and is listed in the Natura 2000 network, it should be given continued attention.

(ORAL)

TWENTY YEARS IN HER MAJESTY'S SERVICE - 20TH ANNIVERSARY OF THE CRACOVIA HUCHEN ANGLING CLUB

WOJCIECH ŁOPATKA

Cracovia Angling Club "Głowatka", Kraków, Poland

Many Huchen were caught in the Dunajec River in the 1970s and 1980s; it was no doubt an excellent time to encounter this fantastic fish. In that period the group of Huchen anglers was rather small and fairly closed. They knew that a new, angler-attractive species had appeared in the Dunajec and were reluctant to share the information. It is thus not surprising that after the rumours of possible liquidation of the only breeding stock in Poland, in Łopuszna, in 1993 the group of anglers established the Angling Club Głowatka.

From the very start, all the activities of the Club were aimed at saving the Huchen in Poland. In 1994 we organised the first Głowatka Cup – a championship or rather a meeting of the Huchen enthusiasts. Thanks to the formula of the

Głowatka Cup, where angling equipment donated by our sponsors was auctioned, we gained funds to purchase Huchen fry. We financially supported the breeding station in Łopuszna and stocked the Dunajec and Poprad. Each year we increased the fry purchase while the station in Łopuszna prospered and increased its production. Till now the Głowatka Cup is our biggest annual event. For more than ten years small ichthyological seminars have been held during these three-day meetings. The lecturers who educated the anglers included prof. dr. Krzysztof Goryczko, prof. dr. Andrzej Witkowski, dr. Leszek Augustyn. Dr. Alexander Harsányi from Germany honoured us with his presence.

We entered into cooperation with the authorities of the Communes Łapsze Niżne and Czorsztyn and with the Hydropower Plants Group in Niedzica. The local authorities realised that angling tourism offered a chance to activate the region, and the Huchen might become a tourist magnet especially during the off-season.

Our activities became popular thanks to the anglers' media. Many reports of our activities were published in the anglers' press and shown in a TV programme „Taaaka Ryba".

The Club's life is not only the Głowatka Cup. The members form a closely-knit, regularly meeting group of anglers of different temperament and education. Angling in good company is the most important thing for them. We have developed our own tradition and a schedule of annual events. One of the great Club traditions is the Christmas Eve in the mountains on the Dunajec, with a folk group and Christams carols. When several dozen men sing "Silent Night" the walls are about to collapse and a tear appears in many an eye. For the Christmas Eve dinner we are often joined by our friends from the Czech Republic, Slovakia, Ukraine and recently from Latvia. The atmosphere is always very good. Obviously, on this great occasion we fish together.

Many anglers and PZW activists blame the Huchen for the decrease in abundance of the Brown Trout and Grayling. The studies of prof. A. Witkowski and Mr. M. Kowalewski, M. Sc., Eng., show that cyprinids constitute 80% of the diet of the Dunajec Huchen. The studies were conducted in 1978-82 and perhaps at that time white fish was more abundant, but we have no grounds to blame the Huchen for selective consumption of salmonids. The studies showed that the Trout and Grayling formed only 12% of the diet. Perhaps it is just that the "meat" anglers who could not accept the idea of releasing the fish they caught contributed to the situation? Besides, the Trout and Grayling are not more abundant in the rivers where there is no Huchen – so the argument is faulty.

Many anglers and scientists think that the Dunajec, Poprad and San should not be stocked with the Huchen because it is not a native fish. It is true that the presence of the Huchen in these rivers is due to unwise decisions which led to the disappearance of the Salmon and Sea Trout in the Carpathian tributaries of the Vistula. At the same time, the same critics enthusiastically fish for introduced Brown Trout and other salmonids in New Zealand or Chile.

At present, in Poland at the ministry level, a debate is held on the native and alien fish species in our waters. The problem pertains also to the Huchen. As the Kraków Club Głowatka, with support from many anglers, we publicly defend the species in the Dunajec and San systems – the only river systems where it occurs at present. We are anxiously waiting for the minister's decision.

(ORAL)

REGIONAL CONSERVATION STRATEGY OF THE SAKHALIN TAIMEN (*PARAHUCHO PERRYI*)

SERGEY MAKEYEV

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The history of research of the Sakhalin Taimen *Parahucho perryi (*Brevoort, 1856) in the Russian part of its distribution range is the following. The first scientific article (Krykhtin et al., 1964) described the Aynskoe lake population in the Western Sakhalin. In the 1970s, Gritsenko and co-authors studied the populations in the Northeast Sakhalin. Parpura, Semenchenko and Bushuev published several articles about the Taimen in the rivers of Primorye. Burlachenko-Korablina, Safronov and Nikitin studied the Taimen on Sakhalin, while Zolotukhin studied them in the rivers of the South Khabarovsk territory.

Protection of the Sakhalin Taimen through legislation began in 1997 when the populations of the Sakhalin Island were included in the Red Book of the Russian Federation. Now these protection measures are outdated. The species was also included in the regional Sakhalin and Primorsky Territory Red Books. A different conservation strategy was adopted in Khabarovsk. In 2006 P. Rand, together with local experts, included the species within its whole distribution range in the International Union of Conservation Nature Red List. The highest degree of extinction threat of the species is reflected by the category "CR" in the IUCN Red list, but the status in this list is only a recommendation.

After that, a detailed study on the status of the species was undertaken by Zolotukhin and Semenchenko. The authors estimated the rate of abundance decrease of mature adults even in best rivers at 15 to 20% a year, and many populations are already extinct (Semenchenko, Zolotukhin, 2011). Sooner or later each local population will get sucked into the so-called "extinction whirlpool" and disappear if nothing is done. Now we are trying to create a map of the current state of populations, using materials from field expeditions and information from voluntary correspondents. The last publication (Fukushima et al., 2011) indicates that the Taimen exists in 110 Sakhalin rivers. Our preliminary estimate of the current status of the species in these rivers is as follows: 11 basins – vulnerable (VU), 37 basins – endangered (EN), 62 basins – critically threatened (CR) or disappeared (EX). The genetic diversity studies were conducted by Dr. Zhivotovsky from the Institute of General Genetics (Zhivotovsky et al., 2011).

It was possible to separate population groups based on their genetic characteristics. Within each group it was possible to identify primary rivers with the best Taimen abundance and genetic diversity. Because of the very high degree of homing, there is no gene flow even between neighbouring populations. This is a

tragedy of the Sakhalin Taimen – having disappeared from a river, they will not recover on their own. In other words, this species forms no metapopulations. We propose to reintroduce the Taimen from the corresponding primary rivers to the basins where its populations have become extinct. Young Taimen raised in either hatcheries or in river incubation pans can be used for reintroduction.

The main threat for the Sakhalin Taimen in Russia is not habitat degradation but decrease in abundance due to poaching, sport fishing, bycatch in commercial harvest and migration route blockage.

To conserve the most charismatic of all Taimen species, the Sakhalin Taimen Conservation Network was created at the beginning of this year, composed of experts from various countries and regions. The Species Conservation Strategy was developed, based on the latest research and with the population principle (Pavlov, 1992) in mind. It should be, first of all, polyvectorous, if possible, *in situ,* and have basic and additional elements as well as aspects of education and public outreach.

This strategy has several directions. Creation of new protected areas located on key rivers has been initiated. Increased protection of the species has been extended to all other rivers. Reintroduction methods for extinct populations are being developed that take into account the genetic diversity. These are the basic components of the Strategy. A further Strategy element that was suggested is the prevention of Taimen bycatch in commercial and sport fisheries, and developing the "catch and release" principle.

A specific public campaign "Sakhalin Taimen year" is being developed for the species conservation. It includes identifying target groups, analysing environment, designing posters, brochures and other materials for propaganda of conservation ideas. We also give popularization lectures to different audiences and make information available on the web-site of the Fishing Club "Sakhalin-Curils" www.sakhriver.ru.

We hope for support of the project from the symposium participants.

(POSTER)

GENETIC DIVERSITY OF THE HUCHEN (*HUCHO HUCHO*) IN SERBIA

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In order to conduct a preliminary assessment of the Huchen genetic variability in Serbia, 14 individuals were collected from six localities, which belong to the Drina (Drina River, Poblačnica River, Uvac Lake and Zlatar Lake) and Zapadna Morava (Đetinja River and Ibar River) river basins. The control region and NADH1 mitochondrial gene were sequenced for all the collected individuals. In addition, two microsatellite loci were genotyped (HLJZ023 and HLJZ003). By sequencing two

mtDNA loci, the presence of the same haplotypes was detected (CR_1 and ND_1). Due to insufficient phylogenetic information, the results obtained indicate that mtDNA can not be used for the detection of the Huchen genetic variability in Serbia. However, variability in the number of repeats within the control region is the only detected polymorphism of mtDNA. Compared with other Huchen populations from the Danube basin, the analysed individuals from Serbia are characterised by the highest number of repeats in the control region (average 8.7). The analysis of the microsatellite data showed that the individuals from Serbia belong to the "eastern" cluster (Slovakia, Ukraine, Bosnia and Herzegovina and Montenegro), except for one individual from the Drina River, which belongs to the "western" cluster (Austria and Slovenia) - probably as a consequence of stocking. By analysing the HLJZ003 locus, three unique alleles were found in the examined individuals from the Serbian territory [336, 356 (Drina and Ibar basin) and 360 (Ibar basin)]. The results indicate that the Danube basin probably has considerably more region-specific alleles than previously thought, which must be taken into consideration in the future species management.

(POSTER)

ARTIFICIAL REPRODUCTION OF THE DANUBE SALMON *HUCHO HUCHO* (LINNAEUS,1758) IN UKRAINE

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Human impact on mountain watercourses of the Carpathian region has resulted in reduction and in some cases in critical status of a number of salmonids (Brown Trout, European Grayling, Danube Salmon), which in the past composed the main part of the fish fauna of the dense river network of the Ukrainian Carpathians. A number of protective measures adopted during the last 30 years in regard to these fishes has not given positive results and the Danube Salmon has disappeared from most of the rivers, which were inhabited by this species historically. Being endemic to the Danube River basin and the largest freshwater salmonid, it has always attracted attention of fish biologists as an object of artificial reproduction and acclimatisation. The history of its culture is more than a century long (Kostomarov 1937, Ivaška 1951, Holčik 1977, Harsanyi 1983).

In Ukraine, attempts at artificial breeding of the Danube Salmon started in 2003. Fish aged 1 to 6 years were the object of investigations. All the age classes expect the yearlings were kept in one pond, since they exhibit no cannibalism or inhibition of younger age classes by older ones (Holčik et al., 1984). Spawning in the ponds took place during the first and second decades of May, after the water

temperature reached 8^0C at night and 12^0C in the day; it was 2-3 weeks later than in natural conditions. For example, in 2008, natural spawning of the Danube Salmon in the Teresva River was observed on 15.04., in 2009 – on 20.04., in 2010 – on 06.04, when the first egg-laying occurred. In artificial conditions, collection of mature eggs was done on the 1st, 9th, and 16th May. The female body weight of fish aged 3-6-years was 1625-3600 g, respectively, the working fecundity was 3600-6500 eggs. The increase in the reproductive index with age was 7.0, 5.7, 6.8 and 5.8%; the number of eggs increased, but their total weight in relation to the body weight decreased. The body weight, length, and working fecundity of the females naturally increased with age. The highest fecundity was observed in a female aged 3 years and spawning for the first time in natural conditions. Unfertilised eggs had the following weight-size parameters: diameter – 3.18-3.47 mm, weight – 30.7–34.1 mg. According to literature data, egg diameter in natural conditions increased with age, but we did not find significant differences in egg sizes, related to the female age.

Egg incubation took 22-38 days, depending on the water temperature in different years, which was on average 235-325 degree-days. The mean water temperature was 11.5^0C (range 6.5–19^0C). It should be noted that according to literature data, the temperature of 19^0C is considered lethal but the mortality rate in our experiments was about 50%, indicating a high heat resistance of the eggs. The mortality rate at temperatures not exceeding 14^0C was insignificant and due to unfertilised eggs. The embryogenesis of the Danube Salmon at increased temperature was 22 days or 235 degree-days, while the values given in the literature [Peňáz, Přihoda (1981) and Witkowski, Kokurewicz (1981)] were 32-36 days (287–339 degree-days).

The results of the studies indicate a possibility of successful artificial reproduction of the Danube Salmon in pond conditions.

(POSTER)

PARASITES OF FISHES OF THE GENERA *HUCHO* AND *PARAHUCHO* - THE STATE OF KNOWLEDGE AND THREATS

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Salmonids of the genera *Hucho* and *Parahucho* are very valuable trophy fishes, and locally – valued objects of commercial catches. Overexploitation, largely resulting from poaching, requires protection of natural Huchen populations and their breeding in controlled conditions. If only for this reason, the knowledge of their parasite fauna seems very useful. The list of parasites of species of the genera

Hucho and *Parahucho* which were studied in this respect, from the whole of their distribution area, includes a total of 88 taxa. Parasitic flatworms are the most numerous: 20 of them represent digenetic trematodes (Digenea), 13 - tapeworms (Cestoda), and 10 – monogenean trematodes (Monogenea), parasites of gills, skin and fins. The remaining groups are nematodes (Nematoda) represented by 16 taxa, hookworms (Acanthocephala) with 10 taxa and crustaceans (Crustacea), with only 7 species recorded till now. The least numerous groups (6 taxa each) are protozoans and leeches (Hirudinea). These numbers are only apparently large. A considerable part of the parasite list of these hosts was compiled in the 1950s and 1960s. Many of them were identified only to the generic level or even family or ordinal level. As a result of numerous changes and taxonomic revisions performed since then, the list of parasites of all the Huchen species has become somewhat outdated. It is probably an underestimate and requires updating and supplementing.

(POSTER)

TAIMEN CONSERVATION INITIATIVES IN MONGOLIA

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According to the Mongolian Hunting Law, a citizen is authorized to catch up to 2 animals for the purpose of household use. However, in 2005 the Taimen was included in the list of "rare animals" of Mongolia. By the Minister's regulation, §79 of 2008, rare fish should be caught with barbless single hook and released into the water. The regulation was also included in the Mongolian Law on Hunting in 2010.

Because of the habitat loss and, consequently, decreasing numbers of the Taimen, measures for the Taimen protection have been implemented on the initiative of the Government of Mongolia, donor organisations, and international environment protection organisations, since 2002.

The ecosystem protection of Eg Uur rivers with financial support of WWF, the World Bank and International Financial Corporation was one of the first initiatives to protect the Taimen and its habitat. The Taimen Conservation Fund of Mongolia is the implementer of the action and cooperates with the Tributary Fund of America, Sweet Water Travel and Mongolian national travel companies, such as Khuvsgul Travel.

The Taimen protection management has been implemented with an initiative of the Tributary Fund based on beliefs and respect of local people for mother nature, since the participation of residents of the province plays a significant role in the Taimen protection. Good examples of cooperation and support for the Taimen protection from international and national nature protection non-government organisations are the

Mongolia Office of the World Nature Protection Fund, the Taimen protection actions with participation of local residents of the Onon River basin, with cooperation of the USA.

Travel agencies, operators and private companies that aimed to develop fishing sports cooperate with the Taimen protection research; constant activities have been implemented in the Eg Uuriin River basin by the Sweet Water Travel, Khuvsgul Travel, in the Delger River basin by the Fish Mongolia, in the Onon River basin by the Nomadic Journey, in the basins of Ider, Chuluut and Selenge rivers and the northern side of the Delger River by the Taimen Conservation Fund of Mongolia and Khuvsgul Travel.

Non-governmental organisations were established on the initiative of citizens, organisations for the Taimen protection of Mongolia such as the Taimen Conservation Fund of Mongolia, Sustainable Tourism Centre and Fly Fishing Association of Mongolia, and Sustainable Fishing Association.

International and national conferences, as well as partnership meetings for the protection management of the Taimen of Mongolia, were held four times.

(ORAL)

ASSESSING STATUS OF *HUCHO* AND *PARAHUCHO* USING IUCN CATEGORIES AND CRITERIA AND PRIORITIZING CONSERVATION ACTION

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Taimen (*Hucho* and *Parahucho* spp.) are coldwater salmonids found throughout Eurasia. They are the largest salmonids in the world, reaching lengths of 2 m; their life span is over 30 years. These fishes are increasingly threatened by overfishing, poaching, habitat loss and climatic changes. At the 2011 Annual Meeting of the Society for Conservation Biology, we convened over 20 experts in the fields of research, management and conservation to focus attention on what we have learned through case studies in the field, to identify key research gaps and to prioritize needed conservation actions to avoid local and species level extinctions. As part of this meeting, we assessed the current status of three Taimen species (*H. bleekeri, H. taimen* and *H. ishikiwae*) using IUCN categories and criteria. While the results of the assessment are still preliminary, it is apparent that the former two species will be regarded as threatened and the latter species - as data deficient. The other two related species (*H. hucho* and *P. perryi*) are both listed as threatened in the IUCN Red List. Concerted and coordinated effort is required to conserve all these species. I will conclude by describing some research and conservation efforts ongoing for Taimen populations in Japan and the Russian Far East.

(ORAL)

MAXIMUM SIZE AND DISTRIBUTION LIMITS OF THE DANUBE SALMON (*HUCHO HUCHO*) AS A FUNCTION OF RIVER SIZE AND GEOLOGY IN AUSTRIA AND BAVARIA

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The Danube Salmon or Huchen is the largest salmonid fish of Europe, historically reaching weights of more than 50 kg. Estimates of the maximum length and weight of this endangered species are an important basis for designing the necessary dimensions of fish passes in its former range. Therefore, data on the longest (up to 1.45 m) and heaviest (up to 36 kg) specimens caught or found dead since 1970 in 28 Austrian and Bavarian rivers were collected. Using the river width and mean discharge as measures of the habitat, a large proportion of the variation of the maximum Huchen size between those rivers could be modelled. In contrast, no influence of the geological conditions could be found. Restricting the analysis to 12 remaining rivers with good stocks of adult Huchen, the model fits considerably better and predicts larger maximum size. A compilation of historic sources revealed that the former distribution in many small rivers stretched out over the grayling region (hyporhithral) partly up to the lower trout region (metarhithral). In different regions of Austria, the historical limits could be reconstructed at sections of approximately 5-10 m width and 0.5 to 2 $m^3 s^{-1}$ mean discharge. In a few such small rivers, the species nowadays still grows up to more than 1.15 m and 15 kg. At the lower end of the range, the Danube was strongly affected by anthropopressure. Therefore, only a short free-flowing section still supports a Huchen stock, which nowadays fails to produce fish reaching the size of the model prediction (1.50 m and 40 kg).

(ORAL)

CURRENT STATUS OF THE SAKHALIN (*PARAHUCHO PERRYI*) AND SIBERIAN TAIMEN (*HUCHO TAIMEN*) ON THE MAINLAND COAST OF THE SEA OF JAPAN AND IN THE AMUR RIVER BASIN

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The Sakhalin Taimen inhabits rivers flowing into the northern Sea of Japan and along the eastern Sakhalin coast, while the Siberian Taimen is found in the Amur River basin. The abundance and habitat range of the Sakhalin Taimen are rapidly diminishing. The fish has already disappeared from the Peter the Great Gulf in southern Primorsky Krai. The rapid disappearance of its populations leads to habitat patchiness and changes in intrapopulation structure. The largest rivers in the species' range are the Poronai River on the Sakhalin

Island (350 km) and the Tumnin River on the mainland coast of the Sea of Japan (365 km). The density of young Sakhalin Taimen aged 1^+ in the Tumnin River is 0.01 fish/m^2, aged 2^+ - 0.035 fish/m^2. The highest density of young fish was found in the Poronai River basin, on the Sakhalin Island, at 0.034 to 0.444 fish/m^2 (average 0.108 fish/m^2). The extinction of the Sakhalin Taimen is due to adult migration to the coast in the spring, where they are caught in commercial salmon harvest. A large proportion of fish are taken illegally in the rivers. The Taimen population in the Samara River basin is under threat of complete disappearance caused by habitat loss due to industrial logging. A specialist group was recently created to develop a conservation strategy for the Sakhalin Taimen through creation of specially protected areas and changes of fishing regulations.

The Siberian Taimen is a widespread species in the Amur River basin. According to the catch ratios, the Taimen were encountered 15 times less frequently in the rivers of the middle Amur basin (mouth of the Ussury River to the mouth of the Zea River) than in the lower part of the basin (mouth of the Ussury River to the mouth of the Amur River). There is no directed commercial harvest of the Taimen. In the Amur River, they are caught as bycatch in the fall, during their migration to wintering grounds, in commercial harvests of other fish. Some Taimen are caught for personal consumption by locals in the winter. A larger proportion of Taimen is caught illegally in the Amur River tributaries with Chinese gillnets. Monitoring of abundance of the Siberian Taimen in the lower and middle Amur basin is conducted by the Khabarovsk regional branch of TINRO-Center (Khabarovsk TINRO). The total abundance in the period of 2006 to 2011 was about 55 tons. The allowable catch is 10 tons, of which the recommended take from the middle section of the Amur River is 0.6 tons and from the lower section - 9.4 tons. Commercial harvest of various freshwater fishes in the middle and lower Amur has never stopped, but the Siberian Taimen stock remains at a satisfactory level. Biological indicators for both species of Taimen (mean weight of one individual in catches - 1 kg, mean weight of a mature fish - 6 kg) and the age structure suggest that the proportion of individuals older than 7 years is quickly decreasing. This is the result of the large-scale illegal catch with Chinese gillnets.

(ORAL)

CONSERVATION PROGRAMME OF THE DANUBE SALMON, *HUCHO HUCHO* (LINNAEUS, 1758) IN SERBIA - PROPAGATION AND REARING EXPERIENCES

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The project "Artificial propagation of the Danube Salmon with the aim of strengthening the natural population in the Drina River" was started in March 2011. Propagation and rearing are conducted at the fish farm "Perućac" in Perućac. Breeders of the Danube Salmon were caught in the Drina River in August 2010, after a massive mortality

situation caused by cleaning of turbines of the hydropower plant "Perućac". The fish caught were transferred to a nearby river Vrelo. At the beginning of April breeders were caught in the Vrelo River, marked, and transported to the fish farm. Fingerlings from artificial propagation conducted in April 2011 were fed with a combination of *Artemia salina*/commercial trout food, and with a combination of *Gammarus* sp./fish meat. The group fed with *Gammarus* sp./fish meat had statistically higher values of average mass and length. A small part of the reared fish was released into the Drina River in October 2011. Their size was between 10 and 12 cm. It is planned to rearrange a part of the Vrelo River, and adjust it as a rearing stream for the Danube Salmon. Long term plans include application of conservation measures, such as continuous monitoring, revitalization of breeding streams, education of locals and fishermen.

(ORAL)

NONSPECIFIC DEFENCE MECHANISMS AND PROTECTION AGAINST DISEASES IN HUCHEN (*HUCHO HUCHO*) GROWN IN A POND SYSTEM OF CULTURE AND IN NATURAL CONDITION

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The defence mechanisms are a highly evolved system that functions to provide fish organism with the ability to resist pathogenic agents and characterised by two pathways. The first is nonspecific cellular and humoral immune response: cellular mediated by phagocytes and humoral presented by lysozyme, ceruloplasmine and interferons. The second is specific immune responses mediated by several activated lymphocytes, which are directed, and specific for an eliciting antigen. Nonspecific cellular and humoral defence mechanisms are a very important part of immunological mechanisms and perform a key role in the regulation of immune response in fish. Several parameters of defence mechanisms have been used to study the influence of xenobiotics, diets and different system of culture on nonspecific cellular and humoral defence mechanisms, specific immune response with level of specific Ig and disease resistance in fish. The aim of this study was examined the nonspecific cellular and humoral defence mechanisms of huchen (*Hucho hucho*) grown in a pond system of culture and in natural condition.

In order to determine the nonspecific defence parameters in pond culture condition, 20 healthy huchen of approximately 30 - 50 g were examined and for determine the nonspecific defence parameters in natural conditions, 20 healthy huchen of approximately 30 - 50 g (catch from Dunajec river) were examined. The fish were anaesthetised in Propiscin (IFI, Poland) and blood was drawn from the caudal vein into heparinized syringes. Also the spleen and pronephros were removed for cells separation. The metabolic activity of spleen phagocytes by their respiratory burst activity (RBA) and potential killing activity (PKA) of the spleen

phagocytes were measured by spectrophotometric assay. The pronephros lymphocytes proliferation (LP) was determined by the MTT colorimetric assay and the mitogens concanavaline A (ConA) or lipopolisaccharide (LPS) were used for the stimulation of huchen lymphocytes. The lysozyme activity in the plasma was measured in a turbidimetric assay and ceruloplasmine activity in the plasma was determined by spectrophotometric micro-methods. The total protein and immunoglobulin (Ig) levels in the serum were measured by spectrophotometric methods. The data were statistically evaluated with the Student's t-test, and the results are presented as mean and standard deviations (SD). The significance level used was $P<0.05$.

This basic examination provides very important information about physiological levels of nonspecific humoral and cellular protection against pathogens in huchen at different environmental condition: in pond system of culture and in river. The analyses of the results showed that the phagocytic ability (RBA) and potential killing activity (PKA) of spleen phagocytes were statistically significant higher ($P<0.05$) in huchen from natural condition, compared to fish from pond culture. The similar pattern was observed in proliferative response of pronephros lymphocytes stimulated by mitogens ConA or LPS. The results showed that the proliferative response of lymphocytes was statistically significant ($P<0.05$) higher in huchen from river, compared to fish from pond culture. The results indicate that the lysozyme and ceruloplasmine activity in plasma and total Ig levels in serum are statistically significant higher ($P<0.05$) in huchen from natural condition, compared to the fish from pond culture. Only statistically significant lower levels of total protein in fish from natural condition were observed. Basic information regarding cellular and humoral defence mechanisms in healthy huchen reared in pond culture and natural condition are very important in monitoring of huchen health and in the early diagnosis of infection diseases in different system of culture.

(ORAL)

APPLICATION OF PROPISCIN – A SAFE NEW ANAESTHETIC IN HUCHEN (*HUCHO HUCHO*) CULTURE

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Anaesthetics are one of the groups of pharmaceutical preparations and they have been used in intensive fish culture to reduce the effects of stress and for reduce mortality after handling and transporting large stocks of fish. General anaesthetics are induced by placing fish in water baths containing the anaesthetic, which is absorbed through the gills and partly through the skin. Many anaesthetics are used in fish, including chloroform, 2-phenoxyethanol, methylpentynol, urethane, MS-222 and clove oil. Numerous investigations, however, have shown that the majority of these are strongly toxic to many species of fish. For instants, very popular MS-222 and 2-

phenoxyethanol causes chemical stress and has a disadvantageous effect on eggs and sperm. A new drug, named Propiscin, was developed at the Inland Fisheries Institute in Olsztyn, Poland. The active ingredient is etomidate. Propiscin has proved to be very successful, and can induce a short period of general anaesthesia, which last about 30 min. When administered in a water bath induced general anaesthesia which was dependant on temperature, fish species and the length of time that fish were kept in the solution. The fish roused when transferred from the solution to clean water and the shorter the time that they were kept in the Propiscin solution, the quicker they roused.

In present study we examined the influence of different concentration of Propiscin for effective anaesthesia in huchen (*Hucho hucho*). The practical application of the Propiscin confection has been tested during controlled spawning, during handling of fish and transport. The results of our study showed that Propiscin is a lowly toxic, safe and very effective product for reducing the influence of polyethiological stress in huchen culture. Until recently, the general anaesthetics used, such as MS-222 and 2-phenocyethanol, allowed the fish to be held for only a short time in the agent solution and did not cause full myorelaxation. Propiscin applied in huchen induce at concentration 1 ml/L of water induce fast anaesthesia and strong myorelaxation for 30 minutes. Also at concentration 0.1 ml/L of water is very effective products for reducing of stress in transport of fish on the long distance.

(ORAL)

CONSERVATION STATUS AND CONSERVATION ACTION PLANS FOR THE MONGOLIAN TAIMEN , *HUCHO TAIMEN* (PALLAS, 1773)

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Mongolia holds three major Central Asian drainage systems: the Arctic Ocean, the Pacific Ocean, and the Central Asian closed basins. A famous German naturalist Peter Simon Pallas described the Taimen and many other fish species from Siberia in the 18th century. Some of them were found in Mongolia later, in the 19th century. Several Mongolian fish species were described in the 19th and the beginning of the 20th century by a Polish scientist Benedykt Dybowski. Nowadays the Russian Expedition under the umbrella of the Russian and Mongolian Academies of Sciences is continuing the long term research on Mongolian fishes. In 2001-2002, the Centre for Nature Conservation, University of Göttingen, together with the Russian Academy of Sciences, Severtsov Institute of Ecology & Evolution and the Mongolian Academy of Sciences, started investigations on the fish distribution and the impact of gold mining on fish assemblages of the upper reaches of the Eroo River (Mongolia) in the Khentii Mountains in North-East Mongolia.

In the Mongolian updated Red List of Fishes (2006), 76 native fish species are listed and from amongst them, eleven are recognised as threatened. The main dangers to the fish populations in Mongolia are water pollution (organic waste and mining), overexploitation and climatic changes.

The natural occurrence of the Siberian Taimen, the world's largest salmonid and a prized game fish, is in northern Mongolia in the Yenisei, Selenga, Orkhon, Onon, Kherlen and Khalkhin-Gol drainage basins. According to the expert assessment, since 1980, the Taimen distribution in Mongolia has decreased by about 60%. Presently, the largest threats for this majestic fish are mining and poaching using gill nets, dynamite and grenades, especially in winter, when the fish congregate in deep pools. There are some legal limitations to catching the Taimen but unfortunately it is still possible to obtain fishing licenses from the Ministry of Nature and Environment only for catch-and-release fishing. There are some conservation plans for the Taimen in Mongolia at the national and regional level. Conservation Action Plans for Mongolian Fishes (2006) were prepared in cooperation with the World Conservation Union (IUCN), the World Bank Netherland-Mongolia, the Trust Fund for Environmental Reform, The Zoological Society of London (ZSL), the National University of Mongolia, the Mongolian Academy of Science and The Ministry of Nature and Environment. At the local level, several American universities together with the Mongolian Taimen Conservation Fund (TCF), International Finance Corporation (IFC), the Global Environment Facility (GEF), World Bank Development and the Sweet Water Mongolian Travel Company have initiated the Taimen Conservation project on the Eg-Uur watershed in Hövsgöl Aimag. The Taimen is not only a species of nature conservation concern but also a charismatic and flagship species. It could be used as an indicator of water quality and simultaneously functions as an umbrella species for the fish communities in its habitat.

Hucho taimen (Pallas, 1773) is the best studied fish species in Mongolia but there is still a need for better understanding of its ecology, especially of the spawning behavior, migration patterns and key factors influencing periodic long-distance migrations and home range shifts. Only good knowledge of the biology of *H. taimen* and sound population data based on global and local assessments may make it possible to evaluate its conservation status and to develop adapted conservation action plans.

(ORAL)

SAMUEL IVAŠKA – THE PIONEER IN THE DANUBE SALMON FARMING

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The first reports about the Danube Salmon captive-breeding date from 1876, when Guber and Rowland were able to strip one pair of the Danube Salmon in the ponds of the Orava Compossessorate and subsequently rear the fry. Since then, many breeders have attempted the same with different results not only here, but also in other parts of Europe, where the Danube Salmon naturally occurred. After 1924 R. Kottl tried Danube Salmon farming at Kláštor pod Znievom, where Ivaška practically acquired his breeding experience. Many of those attempts failed to various extent, depending on the fish brood survival under pond conditions. The failures were caused by unexplained problems related to the Danube Salmon farm-

ing, since adult fish were caught on their spawning grounds in the rivers, and then transported to the ponds, where attempts at stripping were made. Thus caught fish were of unbalanced age; they were often injured and soon died. In the period of 1935-1937, when the interest in the Danube Salmon farming seemed to have disappeared, Samuel Ivaška took the initiative. As an amateur, he built in Martin city ponds with a hatchery at his own expense. During many years he gradually improved his skills, revising the technological processes and improving the hatchery facilities. Finally came the success, and brood fish began to mature in the small ponds. He successfully solved several problems associated with captive breeding: stripping, egg incubation and fish stock rearing. His farm was often visited by groups from fishing associations, national and international experts, as well as by the general public. The Danube Salmon fish stock was annually dispatched from the farm to the nearby streams and to the waters where the species was not native. His long experience with the Danube Salmon farming was summarised in the book "Danube Salmon – its catch and farming" published in 1951. After several years of attempts, Ivaška successfully solved the problems of close cycle farming and thus became the first to provide the basis for the Danube Salmon farming.

(ORAL)

THE FOOD OF THE DANUBE SALMON (*HUCHO HUCHO*) IN SLOVAK RIVERS

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The task was to ascertain the diet composition of the trophy Danube Salmon caught in the Slovak rivers. The material included fish caught by anglers. We examined a total of 41 fish of average weight of 15.66 kg. The fish came from the rivers Vah (20 specimens), Orava (17), Poprad (2), Dunajec (1) and Hron (1). Ten species and 112 specimens of prey fish were identified in the stomach contents. In addition to the fish prey, the stomach of one Danube Salmon contained remains of four frogs (*Rana* sp.). The prey fish were identified, and their total body length was reconstructed. The prey fish were determined based on the jaw bones mouldboard (salmonids) and pharyngeal teeth (cyprinids). The main prey fish were Spirlin (*Alburnoides bipunctatus*) - 32 specimens, Chub (*Leuciscus cephalus*) - 26, Brown Trout (*Salmo trutta* m. *fario*) – 15, and Barbel (*Barbus barbus*) - 11. Other prey species were Bleak (*Alburnus alburnus*) - 9 specimens, Nase (*Chondrostoma nasus*) - 7, Rainbow Trout (*Oncorhynchus mykiss*) - 7, Grayling (*Thymallus thymallus*) - 2, Common Bream (*Abramis brama*) - 2 and Perch (*Perca fluviatilis*) - 1.

The weight of prey fish was determined for 12 Huchen which were obtained from anglers. With respect to weight, the prevailing prey species were the Chub and Barbel rahter than the Trout. The Chub and Barbel were the dominant prey in the Orava River, the Brown Trout and Rainbow Trout - in the Vah River. Interesting finds include the proper frog (probably jumping) in the diet of the Danube Salmon of 15 kg, and large Bream (42 and 43 cm) found in the stomach of a Danube Salmon from the Poprad (15.5 kg).

(ORAL)

THE EFFECT OF STATIC MAGNETIC FIELD ON THE DANUBE SALMON (*HUCHO HUCHO* (L.)) SPERM MOTILITY PARAMETERS

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The research material - sperm (from 5 males) and eggs (from 3 females) - was obtained during the spawning season in April 2012 from spawners at the Fish Breeding Centre in Łopuszna near Nowy Targ. The sperm and eggs were transported by plane (3 h), separately from each individual, in test tubes, and kept in thermoses placed in isothermal containers with cooling inserts providing appropriate constant temperature, identical to the water temperature prevailing at the spawning ground (4°C), during transport. Sperm from each individual was separately subject to static magnetic field of field intensity 1.5 and 10 mT, for a period of 24 hours, control sperm was not subject to such field. Sperm motion parameters were determined and fertilisation of the eggs was carried out. Sperm mobility parameters after transport and after 24 hours were assessed using a computerised system for sperm mobility analysis (CASA), with the help of Sperm Class Analyzer (Microptic) software. The following sperm mobility parameters were ascertained: MOT - percentage of motile sperm, VSL – sperm's straight line velocity, VAP - average sperm velocity, VCL – sperm's curvilinear velocity, LIN – sperm linear motion, STR – sperm motion straightness, ALH - amplitude of lateral head displacement, WOB - minimum and maximum value of sperm oscillation index, BCF - minimum and maximum frequency of sperm tracks intersecting, and sperm traversing time. Fertilised eggs were incubated at constant temperature of 5.0±0.1°C. The proportion of fertilised eggs was specified at the time of blastopore closing.

The average value of MOT in the control series, after sperm transport, was 51.9%, and after 24 hours - 52.0%, while the number of mobile sperm under static magnetic field of intensity 1 mT was 68.1%, under 5mT - 54.7% and under 10 mT - 65.9%.

Following the transport, the average proportion of fertilised eggs in the control series was 50%, and after 24 hours - 33%. In the case of sperm stored for 24 hours under static magnetic field of 1 mT intensity, the fertilisation percent was 71%, while at 5 and 10 mT intensity it was 58 and 60%, respectively. The highest average value of VCL was recorded for the sample which was subject, for 24 hours, to static magnetic field of 10 mT intensity; the value was 250.7 μm/s. The lowest mean VCL was observed in the control series after 24 hours and was 224.0 μm/s. The highest mean LIN was observed in the control, on the first day of the experiment (64.6 μm/s), and was the smallest in the sample subject, for 24 hours, to static magnetic field of 10 mT intensity - 38.5 μm/s. The highest mean VAP was recorded on the first day of experiment, in the control (226.4 μm/s), and the lowest - in the control after 24 hours. The results suggest that short-term (24 hr) exposure of the Danube Salmon sperm to low-intensity static magnetic field has a positive effect on their mobility and increases their fertilising ability, compared to the condition of the sperm immediately after collection and transport.

(POSTER)

ANALYSIS OF POPULATION GENETIC STRUCTURE OF THE TAIMEN (*HUCHO TAIMEN*) IN CHINA

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Hucho taimen is the largest and most endangered salmonid species. It is a famous and precious cold-water fish in China, and it has a great economic value. It takes the first place among the eight famous fishes in Heilongjiang; they were listed as endangered species in 1998 in China. The Taimen inhabits rivers at high latitudes, in cold climate, deep and with rapid current, with long-lasting ice cover, low temperature, high oxygen content, gravel bottom and lush vegetation. In recent years, its natural habitats, including spawning grounds, have been severely damaged due to environmental degradation and human intervention. To protect and exploit this treasure species effectively and continually, investigations on its population structure, resources and artificial production have been conducted. In China, at present it is distributed mainly in the Heilongjiang River and the Irtysh River. There are very few Taimen in the Irtysh River, and we failed to catch any. Population genetics and structure of the Taimen are investigated only in the Heilongjiang River; we use microsatellite markers and partial sequences of mtDNA. The results show that the Taimen in the Heilongjiang River is severely threatened by drastic environmental changes and overfishing; the genetic diversity is low. It will become endangered if measures to protect its habitat are not taken.

(ORAL)

THE HUCHEN (*HUCHO HUCHO*) IN CROATIA - PAST AND PRESENT

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The Huchen (*Hucho hucho*) inhabits the rivers in north-western Croatia, direct or indirect tributaries of the Danube. Its IUCN status in Croatia is the same as in the IUCN Red list – endangered (EN). The main threats are dams and river regulations, together with water pollution. This is particularly true of the Drava River, where before the Second World War specimens over 30-40 kg were regularly caught, while now even small specimens are only sporadic. The most exact data exist on the Huchen caught in the 1970s and 1980s from the rivers Kupa, Dobra and Una. This enabled us to calculate their growth in length. The growth pattern in all three rivers was similar and exhibited a high growth rate even in later years, so it was

not possible to calculate the von Bertalanffy growth curve. However, cubic regression between age and length fitted the best. According to these investigations the Huchen from these rivers reached the average total length of 33.76 cm in the first year, 67.01 cm in the fifth year and 113.45 cm in the tenth year of life.

The registered data from the last decade (2004-2010) show catches of only 1 to 3 specimens a year from the Kupa river and only two from the Drava river. However, the accuracy of the data has to be considered with great caution. There are reports of catches that were never registered. A postgraduate student in fisheries, who practices catch and release, has accumulated data on his catches. According to the evidence it was possible to count the length-weight relation of the Huchen between 60 and 90 cm of total length from the Kupa and Una rivers ($W = 0.0013\ L^{3.4674}$). At 60 cm they reached 2 kg and at 90 cm - 8 kg. The Fulton cubic condition factor was: $CF = 0.9967 \pm 0.0797$.

It can be concluded that the Huchen still swims in some Croatian rivers. Nevertheless, the strict management plan is essential.

(ORAL)

THE ICHTHYOFAUNA OF THE LARGEST RIVERS OF THE NORTHERN COAST OF THE BLACK SEA: THE RECENT SCOPE

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The Danube, Dniester, Dnieper, Don, and Kuban are the largest rivers on the northern coast of the Black Sea. Berg summarised his own and literature data on their ichthyofauna in his famous monograph, which was published in 1949, before any significant growth of human pressure on natural waters began. He included all of these rivers as part of the Danube-Kuban district of the Black Sea region and indicated endemic species when examining differences in their ichthyofauna.

At that period, according to Berg (1949), the ichthyofauna of the Danube River was characterised by the greatest biodiversity and included 81 species, whereas the ichthyofauna of the Kuban River, with its 57 species, was the poorest. The Dniester River, according to Berg, had 72 species, the Dnieper River - 73 species, and the Don River - 62 species. Further analysis of the main alterations in the ichthyofauna of most of these river systems, done during ca. the next 50 years, revealed significant or even drastic changes following dam construction, pollution, introduction, and other human activities (Vasil'eva 2003). As a result, the number of species recently recorded from these rivers has considerably changed and at the beginning of the 21st century included: in the Dnieper River 93 species (9 exotic), Dniester – 91 (13 exotic), Don – 78 (10 exotic), Kuban – 95 (16 exotic) (Vasil'eva 2003). In addition to introductions, invasions or progressive dispersal of alien species replacing the native fauna in modified habitats, many native species have lost their breeding sites, migration routes and even suitable feeding habitats in the new hydrological regimes. This process of modification is still continuing. For example, the Amur Sleeper *Perccottus glenii* which

populated the Don and Dniester river systems before the end of the 20th century, at present is also well known from the Dnieper and Danube.

The Danube River system, being characterised by the largest catchment-area attributed to different landscape zones and countries, more than 20 large and numerous small tributaries, is certainly among the most modified river systems in Europe. As a result of damming, anadromous fishes lost their spawning sites and migration routes in the Danube River, and thus most sturgeon species randomly occur in its lower part only. Considerable changes of hydrological regime resulted in wide resettlement of euryhaline species, and now *Neogobius eurycephalus* dominates among other gobies in the lower part of the Danube, and *Proterorhinus semilunaris* is recorded from Hungary and Austria.

In a combined list of species for the Danube River in different countries, the number of recorded species will exceed 140 (compared to 81 species according to Berg 1949). These surprising changes are caused not only by incorrect duplication of species names as a result of misidentification in some publications (e.g. in *Cobitis*), mixture of recent and previous taxonomic hypotheses (*Rhodeus*), unjustified description of new species or resurrecting some previously synonymised names (*Coregonus*), or by direct ignoring of recent knowledge (*Carassius*). Certainly, the main sources of increasing biodiversity are not taxonomic revisions and more detailed and careful studies of fish distribution, but continuing introduction, invasion and dispersal. The most "popular" introduced species which have entered the native waters are *Coregonus peled*, *Oncorhynchus mykiss*, *Salvelinus fontinalis*, species of the genera *Gambusia*, *Poecilia*, *Hypophthalmichthys* and *Ictiobus*. The species with the best penetrating and dispersal capacities is the Topmouth Gudgeon *Pseudorasbora parva*, accidentally introduced together with Asian Carps and recently recorded from different parts of the Danube River system.

(ORAL)

THE RECENT STATE AND PRESUMED FUTURE OF *HUCHO* AND *PARAHUCHO* SPECIES IN RUSSIA

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The Taimen, *Hucho taimen,* is the only species of the genus *Hucho* in the Russian Federation. This freshwater species has wide historical distribution: it is known from some rivers of the European part of Russia, in Siberian rivers from Ob' to Indigirka, in the lakes Baikal and Teletskoye, and in the Amur River basin (Tugur and Uda rivers). Recently the Taimen has practically disappeared from most rivers of the Kama catchment (Volga River basin). Its populations in the Pechora River drainage are in critical state. In most rivers of the Polar and Middle Ural it has become very rare. The main reasons for the drastic decrease in its abundance are poaching, damming and pollution of rivers. That is why several populations, namely from the European part of Russia and from the Polar and Middle Ural, were included in the Red Book of the Russian Federation (2001).

Previously, the Japanese Huchen (or Sakhalin Taimen) was included in the genus *Hucho*, later it was transferred to a separate monotypic genus *Parahucho – P. perryi*. This anadromous species occurs in the rivers and neighboring brackish waters of the Khabarovsk District and Primorskii Krai, in the Sakhalin Island, Hokkaido and northern part of the Honshu Island. The species is characterised by late maturation (at 10-14 years with total length about 108-116 cm) and females spawning several times in their life, but only sporadically. Therefore the species has low reproduction rate and low population abundance. As a result of overfishing (commercial fishing, poaching, amateur fishing), the number of the Sakhalin Taimen continuously decreases, and the species has already disappeared from some rivers of the southern part of the Sakhalin Island and in the Primorskii Krai. The Sakhalin Taimen is included in the Red Book of the Russian Federation (2001), in the Red Book of the Sakhalin District (2000), and the Red Book of Primorskii Krai (2005) as a vulnerable species.

The list of species included in the Red Book of the Russian Federation was officially signed in 1997. This year we can celebrate the fifteenth anniversary of the official recognition of vulnerable or critical status for both these species, but the last years have not resulted in any appreciable improvement. Including the Sakhalin Taimen populations in the Red Books, and consequent limitation of its catchments, seems more or less sufficient for the conservation of species, but the same measures are not enough for the conservation of the Taimen threatened mainly by habitat loss and pollution. Certainly, special programmes of artificial breeding and re-introduction, and designation of special protected areas are necessary to protect both species.

(POSTER)

PARAHUCHO PERRYI AS A POSSIBLE LINK BETWEEN *ONCORHYNCHUS* AND *HUCHO-BRACHYMYSTAX* GROUP OF SALMONS

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The recent widely accepted concept regards Southern Europe or the neighboring areas as the centre of salmonid origin. Their spread in the Pacific basin may have occurred through the Bering Strait or through Southern Siberia and the Far East region. Both ecological features and specific recent distribution areas point to the first way for charrs (genus *Salvelinus*), whereas the appearance of *Oncorhynchus* (including the genus *Parasalmo*) in the Pacific basin seems unclear. Victorovsky (1978) concluded that the genus *Parasalmo* had originated from *Salmo* salmons and penetrated the Pacific area through the mountain systems of Southern Siberia prior to the split of the range. This hypothesis, however, should be rejected because of the absence of salmons closely related to *Salmo trutta* in the Far East region, and the close dependence between the recent distribution of the "*Salmo trutta"* species group and glaciations, etc. (Vasil'ev 1984, 1985). At the same time, the genus *Hucho* is distributed almost

continuously from Europe to the Far East, and the distribution of species of the genus *Brachymystax* extends from the Ob' River to the Far East and China.

The karyological data on the Japanese Huchen *Parahucho perryi* contributed considerably to the phylogenetic hypothesis on salmonids. The karyotype of *Parahucho perryi* consists of 62 chromosomes with NF=100 (Vasil'ev 1984, 1985) and significantly differs from the karyotypes in *Hucho* (2n=82-84, NF=112-116) and *Brachymystax* (2n=90-92, NF=116-120). At the same time, this karyotype is very similar to the karyotypes of several species in the genus *Oncorhynchus*. Owing to this, two possible schemes of phylogenetic relationships in Salmoninae were presented (Vasil'ev 1985); both of them were based on karyological data by using the principle of minimizing the number of chromosome mutations. These schemes are similar in the presence of two clades: the first clade includes the genera *Parahucho* and *Oncorhynchus* (+ *Parasalmo*), and the second one - *Brachymystax*, *Hucho*, *Salvelinus*, *Cristivomer*, *Salmo* and *Salmothymus*. They differ in the origins of the first clade: in the first scheme this clade originates from the genus *Hucho*, whereas in the second scheme – from *Brachymystax*.

Later, mitochondrial DNA restriction analysis (Shed'ko et al. 1996) demonstrated the intermediate position of *P. perryi* between the genus *Brachymystax* and *Hucho taimen* on the one hand and *Oncorhynchus masou*, *O. kisutch,* and *O. mykiss* on the other. It should be emphasised that the karyotype of *P. perry* is the most similar to the ones of aforementioned *Oncorhynchus* species. UPGMA dendrogram summarising the sequence divergences among 29 composite mtDNA genotypes detected in 11 taxa of salmonid fishes revealed two clades (Shed'ko et el. 1996): the first clade included species of the genera *Brachymystax*, *Hucho* and *Salvelinus*, and the second clade consisted of *Oncorhynchus* species and *P. perryi* situated at the base of this clade. Thus, both karyological and molecular data demonstrate that the Pacific *Oncorhynchus* salmons have originated from the genus *Hucho* (possibly, from *Brachymystax* or their common ancestor) with the Japanese Huchen as an intermediate stage.

(POSTER)

THE DANUBE SALMON IN THE ZAKARPATYE REGION OF UKRAINE - CURRENT STATE AND PERSPECTIVES

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Unique aquatic ecosystems created by nature on the Tisa River and its tributaries represent important natural potential for propagation of a number of especially valuable salmonids. The most unique and valuable representative of the

fish fauna of the Tisa River is the Danube Salmon (*Hucho hucho* Linnaeus, 1758). This fish is listed as an endangered species in a number of nature-protection lists: protected species according to the Fishing Rules for Inland Water Bodies of Ukraine (1985), Rules of Recreational and Sport Fishing in Inland Waters of Ukraine (1990), endangered species according to the European Red List (1991) and the Red Book of Ukraine (1994, 2009).

Several research fisheries surveys focused on the distribution of the Danube Salmon and current state of the fish fauna of the Tisa River basin in 2009-2010. The fish were caught using gill nets (set and drift nets) as well as fly fishing techniques.

Several sites of the Danube Salmon were identified in the Tisa River basin. According to local residents, recreational fishermen, forestry workers as well as official statistical data of the Head Board of the Transcarpathian Fish Protection Inspection, the Danube Salmon migrates during spawning period from the Tisa to the Borzhava and Rika rivers. Major current spawning grounds are in the main tributaries of the Teresva River (Luzhanka, Krasna, Mokryanka, Brusturyanka) as well as in the Shopurka, Tisa, and Chorna Tisa rives.

An important result of the studies on the Danube Salmon biology was the determination of the wintering sites, which were taken under State protection during winter period. The wintering grounds in the Tisa River basin include 18 sites with a total area of about 7 ha.

Based on our data, it was found that the distribution of the Danube Salmon covers all reaches (lowland, sub-montane and montane) of the Tisa River basin within the Transcarpathian region of Ukraine. At the same time, the species was not recorded from the Uzh and Latorytsya rivers.

Several ichthyological protected areas were created for conservation and protection of spawning sites of the Danube Salmon: “Ust-Chorna” on the Teresva River, “Chorna Tisa” on the Chorna Tisa River and “Kisva” on the Shopurka River. Despite 30 years of protection measures aimed at the Danube Salmon, they did not ensure an increase of the abundance of the species, which would reflect the sustainable development of its populations. Due to this fact, the Danube Salmon cannot be excluded from the list of protected species. For solving this problem, the programme “Propagation of salmonids in the Tisa River basin for 2008-2017” was developed.

During the last three years, protection of rivers during spawning of the Danube Salmon showed some positive trends of an increase of brood fish pairs on the spawning grounds. The number of registered fish nests on the Teresva River was 14 in 2010, 18 in 2011, 25 in 2012. It was found that the first fish which go to spawn are small brood fish of 2-5 kg body weight, which have fattened near the spawning grounds, at water temperature of about 4^0C. In 5-7 days, fish larger than 10 kg are observed on spawning grounds.

Considering that the Tisa River basin covers the territory of Romania, Hungary, Slovakia, and Poland, it is necessary to join the efforts for common activities aimed at conservation of the Danube Salmon, as well to exchange experience on the technologies of its artificial reproduction and raising.

(ORAL)

GENETIC RELATIONSHIPS AND PHYLOGEOGRAPHIC STRUCTURE OF *HUCHO HUCHO*, *HUCHO TAIMEN* AND *PARAHUCHO PERRYI* WITH SPECIAL NOTES ON THE PROTECTION OF THE MUR RIVER HUCHEN IN AUSTRIA

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We present the current knowledge on the phylogeographic patterns of *Hucho hucho*, *H. taimen* and *Parahucho perryi* as well as their respective phylogenetic placement among salmonid fishes. *H. hucho* is shown to have extremely limited mtDNA diversity within its endemic Danube basin distribution, hypothesised to be the result of historical small population sizes, a limited refuge and post-glacial expansion. A weak signal of structure is seen between populations from Austria and Slovenia and those farther downstream in the Danube drainage. *H . taimen* shows similarly limited lineage variation within major Siberian drainages (Lena, Yenisey, Amur, Ob), but some divergence among the drainages. The Taimen from the Urals are clearly *H. taimen*, and not *H. hucho*, nor an intermediate form, as historically hypothesised. *P. perryi* displays some weak geographic structure based primarly on a few isolated populations, signs of introgression and hybridisation with *Salvelinus malma*. *H. hucho* and *H. taimen* are clearly sister species, whereas *P. perryi* is clearly not closely related to *Hucho*, being closer to the genus *Salmo* than any other salmonid. *H. hucho* in the Mur River represent the largest self-reproducing population in Austria, and perhaps central Europe. Continued hydro-power plant development threatens this population; the most recent efforts to protect this species in the river are discussed.

(ORAL)

THE HISTORY OF THE HUCHEN *HUCHO HUCHO* (L.) IN THE POLISH WATERS

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Within the post-war boundaries of Poland autochthonous Huchen occurred only in the rivers Czarna Orawa and Czadeczka – tributaries to the Orawa (Orava) and Kysuca which in turn are tributaries to the Vah River. As a result of poaching in the

upper part of the Czarna Orawa system (on the Polish side) and building of the Orawa dam lake (Oravska Priehrada) in Slovakia in the middle 1950s, only single individuals of the Huchen appeared in the spawning grounds. The access of the Huchen to the Czadeczka was rendered difficult by the biological barrier (industrial sewage) on the Kysuca River and by the poaching pressure which was strong in the region.

Under the circumstances, in 1955 the Kraków Branch of the Polish Angling Association caught six Huchen in the spawning grounds in the Czarna Orawa and made the first attempt at artificial breeding in Poland. Because of the lack of experience in biotechnique of rearing of juvenile stages, only 300 autumn fingerlings were obtained in that year, and the Czarna Orawa was stocked with 160 of them. Next catches of spawners in the river were done only in 1963. The spawners were probably the last Huchen in the Polish section of the river, since later no Huchen were observed there. Since then, attempts were made at creating a basic stock in Łopuszna from individuals reared in the ponds. During the first ten years the quantity of the stocking material produced was small, ranging from 8 to 30 thousand fry per year.

In the middle 1970s, when the spawning stock included 60-70 fish, the fry production started growing from year to year. At that time another spawning stock was formed in Zawoja. In the initial period the whole production in Łopuszna was used to stock the Czarna Orawa system. In total, during four years (1955, 1963-1965) 172.5 thousand fry and 10.4 thousand fingerlings were released there. At that time the Slovak Angling Association undertook to stock the Czarna Orawa system during five years with 100 thousand fry and 10 thousand fingerlings. However, the results of the joint stocking efforts were meagre.

When the Sea Trout and Salmon stopped reaching the Carpathian tributaries of the Vistula (building a dam on the Vistula), it was decided to introduce the Huchen into the upper part of the Dunajec system. The decision was prompted by the fact that already in the middle 1950s anglers caught Huchen in the Poprad, and in 1956 or 1959 the first Huchen were caught in the upper Dunajec. The apperance of the Huchen in those rivers resulted from the regular stocking of the Poprad with Huchen fingerlings by the Slovak Angling Union after World War II; from there the fish spread fast into the main river.

Since 1966 further stocking in Poland was conducted only in the rivers within the Carpathian part of the Vistula system, and later also in the Sudetic tributaries of the Odra. In the first period the number of fish released into the Dunajec was small, ranging from 8 to 35 thousand fry per year. In 1980-1987 the number of Huchen fry released every year was 60-305 thousand. Apart from the spawners breeding in Łopuszna, in consecutive years (’70-’80) attempts at Huchen breeding were made also in other fish farms (Rumia, Czarci Jar, Zawoja, Rutki).

In 1972, 20 thousand fertilised eggs were imported from Slovakia in order to increase the genetic diversity of the spawning stocks. For better results, every year eggs were also obtained from wild fish caught in the Dunajec and its tributaries. The biotechnique of stocking material production was perfected constantly. It should be emphasised that the Department of Salmonid Breeding, Institute of Inland Fisheries, in Rutki greately improved the technology of Huchen breeding through solving an array of problems: limiting the post-spawning mortality of spawners, feeding the fry and fingerlings with granulated feed, obtaining spawners fed with artificial feed with small addition of fresh and frozen fish, during complete breeding cycle. These methods of

Huchen breeding resulted in the increased production of stocking material only in the middle 1980s; in 1984 the production in Poland exceeded 250 thousand fry. In 1955-2011, 13.6 million fry and 4.5 million fingerlings were produced in Poland, for the purposes of stocking open waters and for further breeding.

As a result of regular stocking, the Huchen soon spread in the Dunajec system. Many factors contributed to the success, the most important being the high water quality and the great abundance of rheophile cyprinids which constitute the Huchen's main prey.

Other rivers in the Vistula system where attepmts were made at introducing the Huchen were Soła (1970), San (1976), Skawa (1978) and Raba (1984). Within the Odra system the Huchen was introduced into the Nysa Kłodzka (1968 and 1975) and Bóbr (1987-1988 and 1994-1996). In 1991-1995 an attempt was made at introducing the Huchen in the system of a moraine river Gwda (tributary to the Warta, Odra system, NW. Poland), of a character different from that of the Carpathian rivers and the Sudetic tributaries of the Vistula and Odra.

Except for the San, the introductions in the remaining rivers did not bring the expected results in the long run. The reasons included not only the then considerable water pollution, but also the very small abundance of cyprinids. According to various sources, single individuals of the Huchen are still sporadically observed there, which would indicate the existence of small, self-sustaining populations.

At present the Huchen in Poland occurs in three rivers: Dunajec, Poprad and San, on their combined length of ca. 400-450 km. The programme of Huchen restitution in the Czarna Orawa is bringing the expected results. After 10 years of stocking, in 2011, for the first time since more than 50 years, several adult fish were observed at the outlet of the river to the Orawa lake.

Regretfully, our success in saving the Huchen for the Polish ichthyofauna (as a result of successful introduction in the Vistula system) has been recently condemned by some angling journals and also by some fishermen who accuse the Huchen of decreasing the abundance of Grayling and Brown Trout, while disregarding their own mistakes in the management of these species and the effect of some abiotic factors, such as changes in the water level caused by hydropower stations at dam lakes.

(ORAL)

ARTIFICIAL BREEDING TECHNOLOGY OF *HUCHO TAIMEN* IN CHINA

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The Heilongjiang River Fisheries Research Institute, Chinese Academy of Fishery Sciences, attaches great importance to the study of the Taimen. The research on artificial breeding of the Taimen started in 1958. Juvenile Taimen, caught the wild in 1997 and kept in a pond, matured in 2001 and the artificial breeding was

successful. In 2002-2005 the artificial breeding technology was perfected; in 2006 the Taimen resulting from the artificial breeding matured, and spawned for the first time, which testifies to the success of artificial propagation. From 2007 till present, the artificial propagation yields more than 100 million eyed eggs annually, sufficient for a large-scale production and making it possible to complete the breeding cycle of the Taimen. Subsequently, the habitat recovery and reintroduction were performed in the original site of the Taimen in the Heilongjiang Province, Inner Mongolia and Jilin Province. After five consecutive years (2007-2011) of stocking of the Huma River, a tributary of the Heilongjiang River, with the Taimen, since 2008 the species began to appear where there had been no Taimen before 2007, and the proportion reached 10% in 2011. Twenty four individuals (weight between 500 and 2000 g) of the Taimen were caught in September 2011 in the place of release. It shows that the Taimen stocking plays an important and active part in the resource recovery of *Hucho taimen.*

(ORAL)

THE CURRENT DANUBE SALMON POPULATION OF THE VAH RIVER

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The Danube Salmon is the biggest salmonid fish found in Slovakia, and is native to the Liptov region. As the most valuable fish species it certainly deserves attention. Within the second half of the last century the population of the Danube Salmon has suffered serious losses, and the Váh River no longer naturally sustains a healthy population. The river was highly polluted by sewage discharged from the Liptov industrial sector and it was also partitioned by the dams Krpeľany and Liptovská Mara. Today, and since the beginning of the 21th Century, the present Danube Salmon population density is substantially below a healthy level mainly due to winter attacks from the cormorant - a local bird species. The fishery management of the Danube Salmon is attemtping to strengthen the population by stocking the rivers with young fish from hatcheries every year. However, the future of the species is endangered and the species will face extinction if no appropriate substantial measures are taken.

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The University of Wrocław is one of the largest and the oldest Universities in Poland. It commenced its activities in 1702, as the Leopoldina Academy. Today the University of Wroclaw is a ten-faculty college combines the legacy of the history of Silesia and the Austrian, Prussian, Czech and Polish cultural heritage. It also continues the tradition of Polish Universities in Lvov and Vilnus.

The University of Wroclaw educates nearly 36,000 Bachelor's degrees, Master's degrees and Ph.D. students as well as 3,000 postgraduate ones. It employs 2,000 teachers. It produces about 8000 graduates each year. The University has introduced Bologna System of Education. There is possibility to choose one of three modes of studies: full-time day courses, extramural weekend course and in the form of evening classes.

The University of Wroclaw offers undergraduate (Bachelor's degree) and graduated (Master's degree) programs. There are about 70 specializations in different fields of higher education as well as more than 20 types of Ph.D. studies and nearly 120 postgraduate ones. In addition to the classical disciplines, the University offers specialties associated with modern technology, interdisciplinary studies, and what is more specialties ordered by the Polish Ministry of Science and Higher Education. Thanks to programs funded by the European Union, at the University there are offered studies, specialties, courses, classes, scholarships, internships, students' visa, as well as postgraduate studies. The University has more than 20 program in English, which can be graduated with Bachelor's or Master's degree, as well as nearly 130 English-language courses.

The University of Wroclaw is a prestigious research center. There are produced several thousand scientific publications each year, which are result of work of highly qualified scientists involved in more than 280 research projects. The outcomes of researches are modern inventions and patents. The University is a member of nine scientific networks and 13 industrial consortia. Employees of the University publish in reputable scientific journals, participate in important scientific research, and many of them receive grants from domestic and foreign organizations and institutions. Among the lecturers, key role plays a group of about 400 professors, including tutors, who arrived from foreign universities. They guarantee the highest level of education

The University of Wroclaw can pursue students own ideas – you can take an interdisciplinary studies, create your own unique path of development. International, friendly and open environment allows to develop variety and not only scientific passions and interests.

The University of Wroclaw is the most prestigious university in Lower Silesia and its reputation extends beyond boundaries of the country. Every year, many foreigners from all over the world study at the University. Part of the group is recruited by the University, the other studies at the college for one or a few semesters – they come to the University thanks to different students exchange programs. Such a program agreements were signed with over 370 foreign universities. The University of Wroclaw scholarship system allows students to study not only in European Union countries, but they can also go to the U.S.A. The University of Wroclaw is the only college in Poland offering studies in the ISEP program.

The University of Wroclaw has been involved in student mobility programs for many years: LLP-Erasmus program, which allows to study for one semester or a year abroad at another university, as well as MOST – thanks to the program you can study at another national university.

The University of Wroclaw has over 50 buildings concentrated in a few campuses and located in the city center. University includes Wroclaw Botanical Garden, the Arboretum in Wojsławice, Polar Station on Spitsbergen, Astronomic Observatory in Białków, Meteorological Station on Szrenica in Karkonsze, Ecological Station “Orchid” (“Storczyk”) in Karpacz, Ornithological Station in Ruda Milicka, the Observatory of Meteorology and Climatology in Wroclaw, as well as various schools, such as School of Polish Language and Culture for Foreigners and the School of Archaic and Oriental Languages

POLISH ANGLING ASSOCIATION
Twarda Str. 42, 00-831 Warszawa, Poland, +48 22 620 89 66, +48 22 620 50 85

The Polish Angling Association – the largest association of Polish anglers.

The Polish Angling Association was founded in 1950; it is a continuation of the 130 year history and tradition of Polish organised angling. Being the largest angling association in Poland, the Polish Angling Association has at present more than 635 000 members. Its local units include 45 branches and about 2500 clubs. It is governed by the Main Council in Warsaw.

The aims of the Association are: organising angling, recreation, water use, actions for nature conservation and propagating anglers' ethics. The PAA uses 217.979 hectares of waters which is about 45% of the total surface of the inland waters of Poland. The Association's activities include management and protection of waters, as well as implementation of ecological policy of the State in accordance with the international conventions and the EU directives.

The Polish Angling Association is a member of two international organisations (CIPS since 1958 and EAF since 2007).

The PAA protects inland waters through the activity of the Communal Fishery Guards and employees of the Branch Councils; they are responsible, among other things, for monitoring of the waters and they take active part in stocking.

The PAA gets a very strong scientific backup in promoting ecological angling, with environment protection having priority over economic-commercial activities. In order to recognise the environment of the waters concerned, improve the methods of their management, actively protect the aquatic environment and introduce fishery-angling management which is in accordance with the principles of moderate exploitation of live resources, it closely cooperates with most scientific centres and universities of Poland. The PAA organises or co-organises scientific conferences aimed at presenting the results of scientific studies and exchanging experience.

Popularisation and propagation of angling and ecological knowledge among the youth is among the most important statutory aims of the PAA; the PAA's statutes specify duties of the councils of all levels regarding organisation of work with the youth and financing such activities. The PAA's branches and clubs form youth sections, organise angling courses and camps, ending with fishing licence exams; they organise youth fishing clubs, competitions and educational actions.

The publishing activities include rich guide literature, numerous organisation's bulletins and angling press. These serve presenting the principles of angling organisation, recreation, angling sport, as well as popularising knowledge of water

use, nature protection and anglers' ethics. The PAA pulishes its journal "Wiadomości Wędkarske" [Angling News] the fist issue of which appeared in January 1936. The PAA publishes its scientific journal - Scientific Annals.

The angling sport is realised by angling clubs, which also organise amateurs' competitions. The sports' events include national "Grand Prix", branch championships and Polish championships. Representatives of Poland have participated in international angling championships for years.

STANISŁAW SAKOWICZ INLAND FISHERIES INSTITUTE
10-719 Olsztyn, Oczapowskiego Str. 10, Poland; +48 89 524 01 71,
http: //www.infish.com.pl/

The Stanisław Sakowicz Inland Fisheries Institute in Olsztyn conducts a wide variety of research and publishing activities which aim to disseminate information about and popularise fisheries. The scientific disciplines pursued at the Institute are integral to this field's body of knowledge and include specialisations such as ichthyobiology, limnology, aquatic ecology, hydrobiology, veterinary sciences, and economics.

In 2003 the Institute was honoured with the Michał Oczapowski Medal for significant contributions to the agricultural sciences by the Department of Agricultural, Forestry, and Veterinarian Sciences, Polish Academy of Sciences.

The Inland Fisheries Institute was founded on January 1st, 1951, and it assumed the name of its founder, Professor Stanisław Sakowicz, in 1987. The Institute is a research and development facility that is subordinate to the Ministry of Agriculture and Rural Development.

The mission of the Institute is to perform research and disseminate research results in the field of inland fisheries. The Institute meets this obligation through the following:

- conducting theoretical research and applied scientific studies;
- improving the knowledge of scientific and fisheries personnel through education;
- conducting studies and writing expert opinions and evaluations;
- disseminating research results through, among other outlets, informational activities, publishing, and consultation and training;
- scientific co-operation with Polish and foreign organisations;
- co-operating with administrative and management institutions.

The Institute offers a wide range of services, including:

- evaluating fisheries management plans, loan applications and applications for water rights permits;
- preparing expert evaluations and providing opinions regarding inland fisheries management and estimating fishery damages;
- consultation for the design of rearing facilities;
- producing selective and stocking material of selected fish species;
- diagnosing and treating fish diseases;
- information services and publishing (scientific journals, popular science magazines, books, brochures, etc.).

The Institute is comprised of fifteen units, which include departments, workshops, and sections, that conduct scientific research and services within the fields of:

- natural foundations for optimising initial and early rearing of fish and crayfish;
- fish health prophylactics;
- fishing techniques;
- fisheries management;
- experimental fisheries;
- promoting advances in fisheries.

Research facilities are located in Olsztyn, Żabieniec near Warsaw, Giżycko, Gdańsk, and Rutki near Gdańsk. Experimental hatcheries are located in Żabieniec and Zator near Cracow.

The institute's Scientific Council is accredited to award the titles of Doctor of Philosophy and the Polish post-doctoral degree.

Since its inception over a half century ago, the Institutes's team of scientists and technicians have made significant contributions to the development of fisheries science and practice.

Examples include:

- developing highly effective technologies for producing stocking material of numerous fish species;
- developing breeding methods on a commercial scale for acipenserid species;
- introducing into production trout strains with various spawning terms to increase fish production severalfold;
- long-term management and exploitation projects in over 3,000 lakes, which in addition to immediate advantages, have enabled the compilation of a rich archive.
- providing wide-ranging information that is accessed by scientific, management, administrative and other institutions;
- several decades of interdisciplinary research of the heated Konin lakes system which is a globally unique scientific study.

ALLER- AQUA POLAND
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ALLER AQUA - one of the Most Experienced Fish Feed Suppliers in the World

With nearly 50 years in the sector, Aller Aqua is one of the most experienced suppliers of fish feed for freshwater and saltwater species. Aller Aqua is dedicated to fish nutrition only and therefore our products are tailored to the specific needs of certain fish species.

The Aller Aqua Group International Dimension

With export to nearly 50 countries worldwide the Aller Aqua Group is a truly international company for the development, production and sales of fish feed for the growing market of aquaculture.

The Aller Aqua Group today has production in Denmark, Poland, Germany and Egypt. This gives the group a modern production platform to expand its presence beyond Europe.

From the freshwater market in Europe, where the group has a dominant position it has in recent years established a presence in North and Central Africa, the Middle East and the Far East through a sales office in China. We have also established a presence in the biggest aquacultural market in Europe – Norway, where we mainly are focusing on some of the new marine species being farmed like Cod and Turbot.

Knowledge in Every Bag

The continuous development of existing and new feed types is the responsibility of our Development Department. We collaborate with the best research stations and testing plants. We also engage in ongoing collaboration with our suppliers and, especially, with fish farmers. Aller Aqua's development strategy aims at producing healthy fish with low mortality through quality feed, thereby minimizing the use of medicines and intermediary products. Aller Aqua feed meets the needs of the fish throughout their lifecycle from fry to brood stock fish, and both feed conversion rate (FCR) and the environment are keywords in the development of our feed programmes. Diseases and stress in fish can be prevented using health feed, which strengthens the immune system through systematic interval feeding using feed containing natural immune-boosting substances.

Aller Aqua – not only a fish feed

Aller Aqua contributes to the development of aquaculture sector in various ways. In recent years we are organizing international events such as International

Sturgeon Conference and International Carp Conference, providing a platform for experience exchange and solving common problems. In many countries Aller Aqua offers service regarding equipment, technology solutions, etc. Aller Aqua sales team is built on competent and knowledgeable people, on which fish farmers can rely.

We carefully guard our reputation throughout the world

Customers tell us that Aller Aqua stands for quality and is a highly trustworthy partner in the fish feed industry. Such an image is a source of strength, and of course we take the obligations that come with it very seriously, but most of all, we are proud and honoured by this reputation.

CRACOVIA HUCHEN ANGLING CLUB
Romanowicza Str. 1a, 30-702 Kraków, Poland, tel.: +48 (12) 421 62 71

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Our aim is to protect the Huchen in the Polish waters.
Our activities focus on:
- stocking rivers with both Huchen and naturally associated species (Nase, Chub, Brown Trout and Grayling)
- monitoring river ecosystems and intervening when necessary (e.g. planned hydrotechnical objects)
- cleaning the shores of the Dunajec and Poprad
- educating anglers and locals through organising championships, scientific symposia etc.
- propagating angling tourism and promoting the Podhale Region
- cooperating with scientists from Poland and abroad
- gaining funds for stocking from sponsors, symphatisers and Club members
- disseminating Huchen information through our website http://hucho-hucho.org/kontakt_1_118.html
- consolidating the anglers' society through organising championships, especially the Głowatka Cup
- cooperating with angling journals and angling companies.

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One of the pillars of CSR in KGHM Polska Miedź S.A. is its charitable work performed through the Polish Copper Foundation founded in 2003, a legally-recognised charitable organisation. The idea to establish the Fund was based on the active social policy of KGHM Polska Miedź S.A. Its creation represented a continuation of the Company's charitable and socially-oriented activities, which since the inception of the Company in Lower Silesia have supported a variety of local and national projects.

The Polish Copper Foundation engages in providing subsidies in such areas as health protection and promotion, actions on behalf of the handicapped; science, education and child upbringing; promoting the country and recreational activities for children and youth; culture and art; protecting items of cultural importance and traditions; promoting physical fitness and sport; ecology and nature conservation; protection of environmental heritage sites; public order and safety and combating social pathologies; charitable activities and aiding victims of natural disasters.

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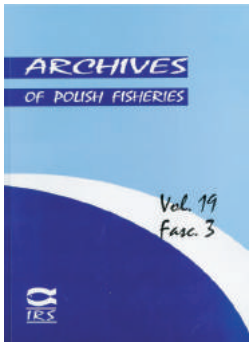

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Conference proceedings

Rybicki J. 1988 – Microbiological decomposition of phosphoric compounds in surface waters – Proc. XV Conf. Inter. Microbiol. Assoc., The Hague 5-10.09.1987, Academic Press, New York: 258-265.?Book

Kottelat M., Freyhof J. 2007 – Handbook of European Freshwater Fishes – Kottelat, Cornol, Switzerland and Freyhof, Berlin, Germany, 646 p.

Book chapter

Zawisza J., Backiel T. 1970 – Gonad development, fecundity and egg survival in *Coregonus albula* L. – In: Biology of coregonid fishes (Ed.) C.C. Lindey, C.S. Woods, Univ. Manitoba Press, Winnipeg: 363-397.

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