WSCS - Student Subunit

December 19th, 2023

Sturgeons in Italy

historical background, current activities and new insights

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Historical Background

3 autochthonous **sturgeon species** were historically present **in Italy**:

Two belong to the genus ***Acipenser***

Acipenser sturio

European sturgeon

Acipenser naccarii

Adriatic sturgeon

One belongs to the genus ***Huso***

Huso huso

Beluga sturgeon

Historical Background

(IUCN, 2022)

Nowadays { ***A. sturio*** European sturgeon; ***H. huso*** Beluga sturgeon } are considered **Regionally Extinct**

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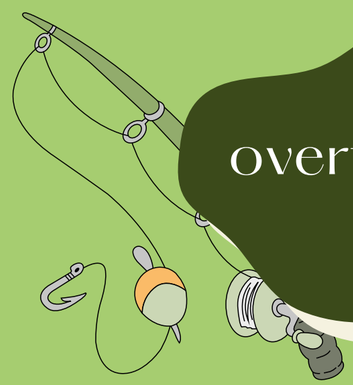
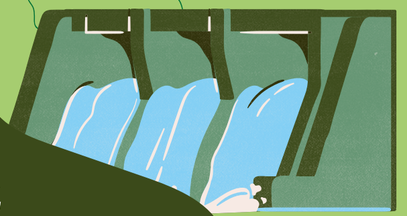
Multiple **factors** led to their **disappearance**

pollution



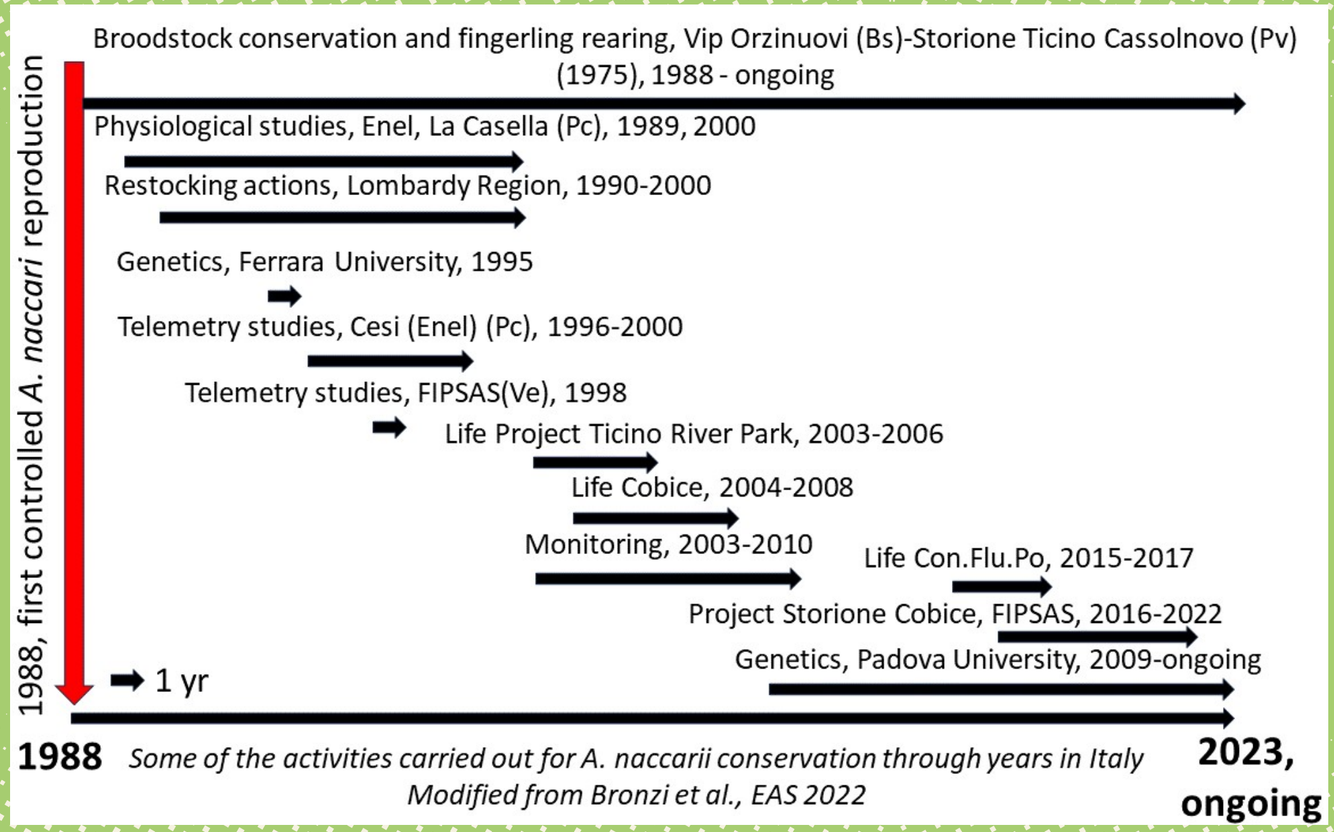
overfishing



habitat degradation

Alien species

Historical Background



Some of the activities carried out for A. naccarii conservation through years in Italy
Modified from Bronzi et al., EAS 2022

CR

A. naccarii

Is present in some **Italian rivers**

All **reintroduced animals** are descended from a **single stock** of wild animals, **caught** in the **70s**

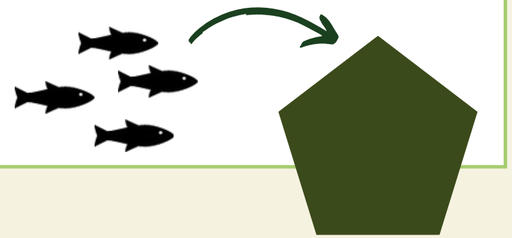
Showed **localised** but encouraging **signals** of **natural reproduction**

Padua University

What do we do?

- **Relatedness** analysis
- **Species** identification
- **Hybrids** detection
- **Development** and **application** of **molecular markers**

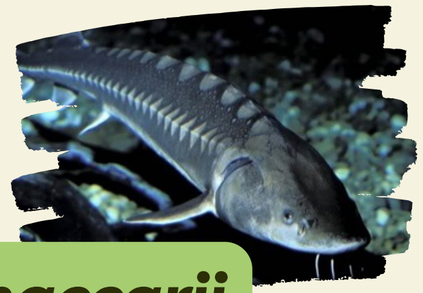
- Establishment of **breeding plans**
- **Reintroduction** and **restocking** activities



Conservational Efforts

Complete genetic characterization of Adriatic and Beluga sturgeon

- **Generic screening** of the existing breeders
- **Preserve** most of the residual **genetic diversity**
- Animals taken from **aquaculture facilities**



A. naccarii

H. huso

- Investigation of **purity**, **relatedness** and **geographical origin**
- **Support to reintroduction** activities in the **Po Valley rivers**

Ongoing projects

MIPS

Multiallele Intron Polymorphisms

Ongoing projects

Alternative category of **nuclear markers** developed in our laboratory

Informative for **molecular ecology studies**

- Nuclear loci with bi-parental inheritance
- Highly-variable
- Flanked by more conserved exon regions
- Amplifiable by PCR
- Potentially highly transferable

MIPS

Multiallele Intron Polymorphisms

Identification of **species** and interspecific **hybrids**

Optimization of data analysis **pipelines** for **polyploids species** analysis

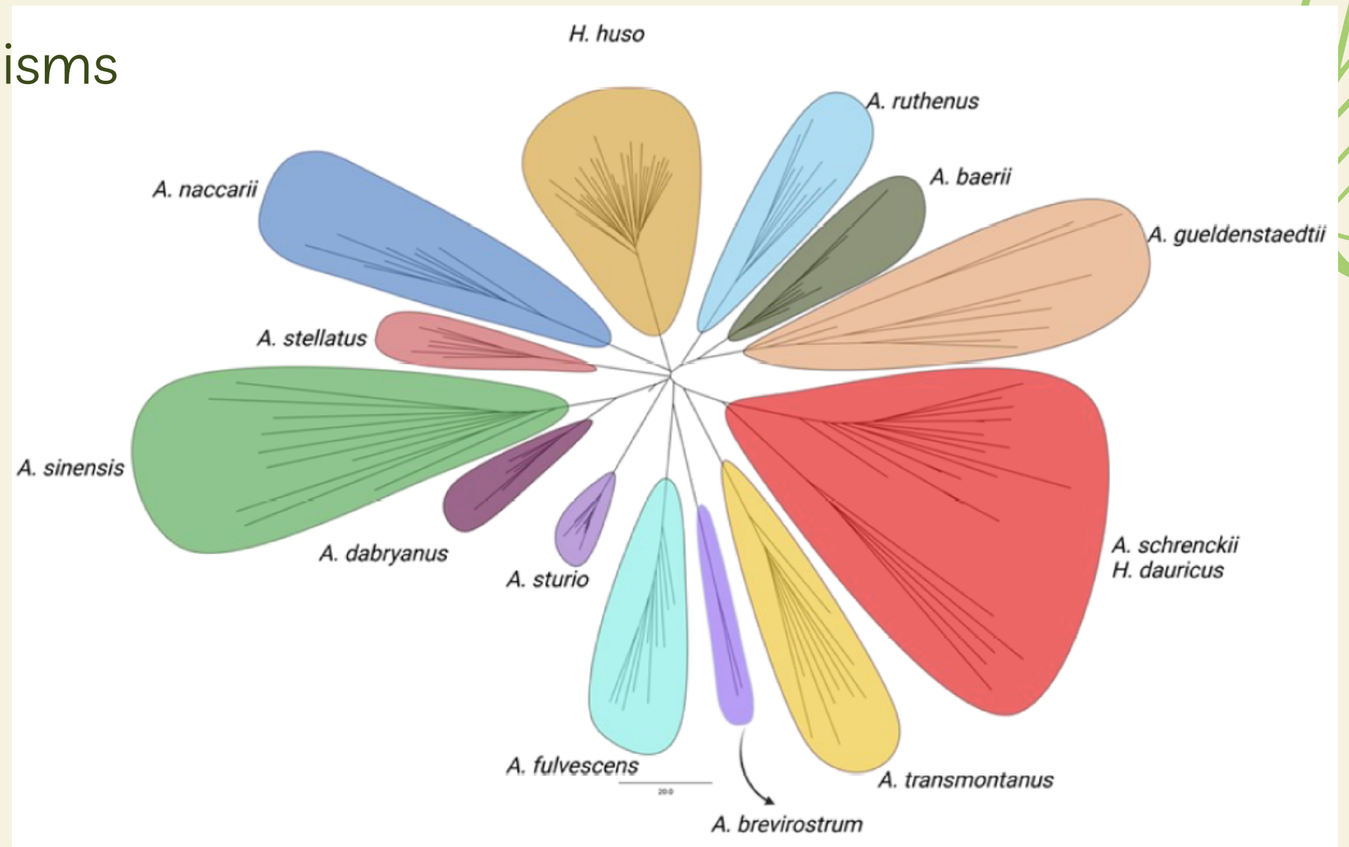


Figure 8 Neighbor-Joining tree based on the number of allelic differences among species for the 18 best characterize intronic *loci*. The genotypes at each *locus* were converted into presence/absence data for each allele. The data were then transformed into a sequence consisting of the T and A bases, to be an input file for the MEGAX software.

Ongoing projects

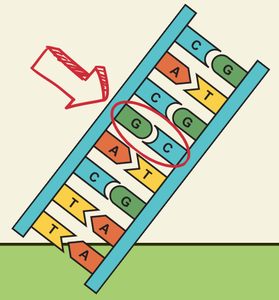
Ferrara University

What do we do?

ENDEMIXIT
Population Genomics of Italian Endemics

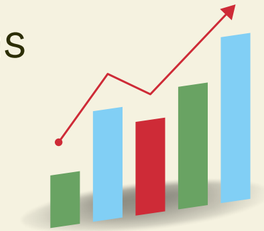
Bioinformatics

- De novo assembly to obtain a high-quality **reference genome**
- **SNP calling**



Population genomics

- **Genetic diversity** and **inbreeding level**
- **Demographic** reconstructions
- **Mutation load** estimations
- Forward **simulations**



Conservation genomics

High quality reference genome for *A. naccarii*

Ongoing projects

Sequencing data

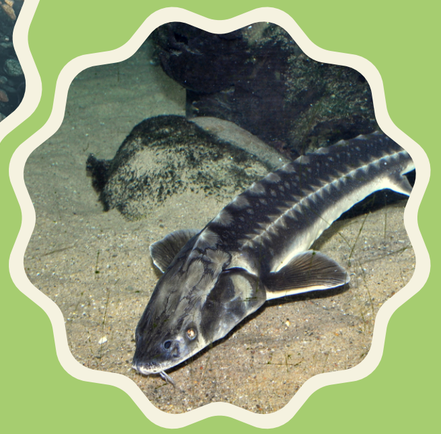
- **PacBio** HiFi reads
- **Arima Hi-C** reads
- **Illumina** reads

Aims

- Develop **tetraploid-specific pipelines** for genome assembly
- Obtain a **chromosome-scale reference genome** with a high completeness

Population genomics of *A. naccarii* and *A. gueldenstaedtii*

Ongoing projects



Genomic data

- 18 **Adriatic surgeons** (small population)
- 10 **Russian sturgeons** (large population)

Aims

- **Comparing** genetic diversity, inbreeding levels, and mutation load
- Make **predictions on the risk of extinction** of *A. naccarii*
- Develop **conservation strategies** for *A. naccarii*

Thanks for your attention

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