RESEARCH ON THE NATURAL HERITAGE OF THE RESERVES VINCHETO DI CELARDA AND VAL TOVANELLA (BELLUNO PROVINCE, ITALY)

Conservation of two protected areas in the context of a LIFE Project
This volume of the series “Quaderni Conservazione Habitat” is the result of four years of research carried out in the nature reserves Vincheto di Celarda and Val Tovanella, in the context of the LIFE Project LIFE04NAT/IT/000190. Both areas are managed by the Italian State Forestry Service (Corpo Forestale dello Stato) and are situated in the province of Belluno. While the first reserve is located in a plain alongside the Piave River, the second reserve is a small secluded valley in the Dolomites. The book includes 33 scientific articles, a general introduction and concluding remarks and treats a wide range of subjects, covering hydrogeology, flora, vegetation, lichens, molluscs, spiders, insects, fish and birds. A number of national and international specialists were coordinated by the Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale “Bosco Fontana” of Verona and contributed to the project. This allowed to describe the biological systems of the reserves at an unprecedented level of detail. For example, a total of 21 species are for the first time reported for the Italian territory. Numerous rare and protected species were also discovered and it was thus possible to consider their ecological needs for the management of the reserves. The multitude of new faunistic and floristic data contained in this volume highlights the elevated level of biodiversity of the reserves and adds substantially to the knowledge of the natural heritage of Belluno province.

Questo volume della serie “Quaderni Conservazione Habitat” è il risultato delle ricerche svolte nell’ambito del progetto LIFE Natura LIFE04NAT/IT/000190 nelle Riserve Naturali Vincheto di Celarda e Val Tovanella, entrambe gestite dal Corpo Forestale dello Stato, Ufficio Territoriale Biodiversità di Belluno. La prima è collocata lungo il fume Piave, mentre la seconda è una piccola valle delle Dolomiti Bellunesi. Questo libro, composto da 33 articoli scientifici, una introduzione generale e da conclusioni finali, tocca una moltitudine di argomenti, come idrogeologia, flora, vegetazione, licheni, molluschi, ragni, insetti, pesci e uccelli. La collaborazione di numerosi esperti, nazionali ed internazionali, coordinati dal Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale “Bosco Fontana” di Verona, ha permesso di descrivere il sistema biologico delle riserve con una accuratezza senza precedenti. Ad esempio, 21 specie sono state segnalate per la prima volta nel territorio italiano e molte altre risultano rare e protette. Le loro esigenze ecologiche sono in seguito state considerate nella gestione delle riserve. La moltitudine di nuovi dati sulla fauna e flora presentati in questo libro, oltre che dare rilievo alla straordinaria biodiversità di questi territori, contribuisce in modo significativo alla conoscenza degli assetti naturalistici della provincia di Belluno.
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First remarks on fish from the running waters of Vincheto di Celarda Nature Reserve

Paolo TURIN, Barbara TUZZATO, Marco ZANETTI

INTRODUCTION

Vincheto di Celarda Nature Reserve is located in Feltre (Belluno province) municipality. Despite its small area, it is characterized by a high environmental value and diverse natural and semi-natural habitats. The reserve extends along the Piave River banks downstream of the joining with the Torrente Caorame. The reserve is delimited entirely by water courses which are all tributaries of the Piave River: the Torrente Caorame to the North, Rio Caoramello to the West, and Rio Celarda to the South (fig. 1). Springs and ponds within the reserve originate from ancient oxbow lakes created by the Piave River. The information regarding the geographical setting, the distribution and ecology of fish species of Italy and Veneto region, together with the results of the assessment of the available running water habitats for fish, where used to identify the expected fish community, which was compared with the observed community. Such a comparison is essential to assess the ecological status of fish communities according to the Directive 2000/60/EC “Water Framework Directive”, which in this work is accomplished by using the Index (I.S.E.C.I.) recently developed by Zerrnian (2004, 2007). The work was funded by the LIFE Project LIFE04NAT/IT/000190.

STUDY AREA

The main water courses of the Vincheto di Celarda Nature Reserve run over wide alluvial plains at a mean elevation of 230 m a.s.l. Four different habitats corresponding to the four main rivers/streams can be distinguished. The Piave River is about 20 m wide, it is characterized by a rubble-gravel bottom, and water temperature reaching a maximum of 16-17° C. The river bed is covered by wide gravel deposits devoid of vegetation. These features are typical of the “upper salmonid zone” (Zanetti et al. 2000). The Torrente Caorame belongs to this category as well. The Rio Caoramello is a small creek, about 3 m wide, with constant discharge, which originates from a deviation of the Torrente Caorame. It runs over flat areas among pastures, water is often clear and high flows are short-lasting; the bed is mainly sand-clay alternating with...
more recent gravel alluvium. Current speed is high, creating the typical features of the “lower salmonid zone”. A different and particularly important stream typology is represented by the Rio Celarda, a krenal stream, about 6 m wide, with constant discharge, large wetted area, strong current alternating with lower current in deep areas, substrate represented by sand and clay with gravel banks. These features are typical of the “lithophilic spawning cyprinid zone”. Due to such habitat diversification, water courses of the Vincheto di Celarda Nature Reserve host quite rich and diverse fish communities, including taxa endemic for the Padanian ichthyogeographic region (Zerunian 2002).

The biological quality of the water courses of the Vincheto di Celarda Nature Reserve was assessed using the Extended Biotic Index (APAT-IRSA 2003) which resulted in a high quality class, with EBI values generally higher than 10 for the entire assessment period (2005-2007). Only in a few instances the EBI value was lower, with a minimum value of 9 recorded for the Rio Celarda in November 2005 (Turin 2007).

MATERIALS AND METHODS

Fish sampling was conducted in May 2006 in five different sites: one in Torrente Caorame, one in Piave River, two in Rio Caaramello, and one in Rio Celarda. Fish populations were investigated by electrofishing, using a backpack electroshocker with continuous pulsating current and adjustable voltage; (3.8-7 A, 300-500 V, 1 500 W). An abundance value was assigned to each species, and a stability index to each population. We used the Moyle & Nichols (1973) abundance index, modified according to Turin et al. (1999), which allows estimating the relative abundance of each species according to the criteria listed in tab. 1.

The stability of each population was quantified by using a simple index which takes into account the population structure as assessed in the field (Turin et al. 1999). This index indicates if the individuals of a sampled population are regularly distributed in the various age classes (tab. 2).
A total of seven species were recorded, belonging to three teleost, and one cyclostom families. Salmonidae were represented by brown trout (Salmo [trutta] trutta), marble trout (Salmo [trutta] marmoratus) and hybrids of the two taxa; Ciprinidae were represented by common barbel (Barbus plebejus), chub (Leuciscus cephalus) and minnow (Phoxinus phoxinus); Cottidae by bullhead (Cottus gobio), and Petromizontidae by the Po brook lamprey (Lampetra zanandrei). The latter was not directly collected by electrofishing, but its presence (already recorded for the area) had been visually assessed in a previous survey. Four of the recorded species are listed in the Annex II of the Habitats Directive 92/43/CEE: Salmo [trutta] marmoratus, Cottus gobio, Barbus plebejus, and Lampetra zanandrei. All recorded species are autochonous but most of the specimen of Brown trout seems to be hybridized with allochthonous stocks.
DISCUSSION

The fish community of the Vincheto di Celarda Nature Reserve is characterized by some interesting elements such as Italian endemic taxa (marble trout, common barbel and Po brook lamprey). In general, fish populations are quite well structured and abundant, even if some disturbance elements were recorded. In particular, salmonid populations showed the occurrence of hybridization and/or the presence of some allochthonous stocks, particularly for the brown trout. It is important to mention the lack of records for the eel, a catadromous species once common in the reserve and today at risk of extinction, due to the presence of the numerous impoundments on the Piave River (e.g. dams, weirs, sluices), which hinder the upstream movement of the juveniles from the Adriatic Sea (Zerunian 2002).

In order to provide a synthetic evaluation of the status of the fish communities of Vincheto di Celarda, we applied the Fish Community Ecological Status Index (ISECI). The focal point of the index is represented by the attribution of a numeric value to the community, using the double-entry table below (tab. 8), which is then converted in ecological status levels by following a reference grid (tab. 9).

Tab. 8. Table for the calculation of the Index of Ecological Status of Fish Communities (Zerunian 2004, 2007).

<table>
<thead>
<tr>
<th>Community composition (first entry in the table, horizontal)</th>
<th>Biological status of autochthonous populations (second entry, vertical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native species</td>
<td>Alien species</td>
</tr>
<tr>
<td>All expected species are present</td>
<td>Absent or with non-naturalized populations</td>
</tr>
<tr>
<td></td>
<td>One or two naturalized species are present; Wels catfish absent</td>
</tr>
<tr>
<td></td>
<td>More than two naturalized species or Wels catfish present</td>
</tr>
<tr>
<td>Most of expected species are present (more than 50%); only taxa non-endemic for Italy are absent</td>
<td>Absent or with non-naturalized populations</td>
</tr>
<tr>
<td></td>
<td>One or two naturalized species are present; Wels catfish absent</td>
</tr>
<tr>
<td></td>
<td>More than two naturalized species or Wels catfish present</td>
</tr>
<tr>
<td>Most of expected species are present (more than 50%); only taxa endemic for Italy are absent</td>
<td>Absent or with non-naturalized populations</td>
</tr>
<tr>
<td></td>
<td>One or two naturalized species are present; Wels catfish absent</td>
</tr>
<tr>
<td></td>
<td>More than two naturalized species or Wels catfish present</td>
</tr>
<tr>
<td>50% or less than the expected species are present</td>
<td>Absent or with non-naturalized populations</td>
</tr>
<tr>
<td></td>
<td>One or two naturalized species are present; Wels catfish absent</td>
</tr>
<tr>
<td></td>
<td>More than two naturalized species or Wels catfish present</td>
</tr>
</tbody>
</table>

Legend:
1. Silarus glanis.

A) All populations well-structured in age classes, and with sufficient or good abundances (present, frequent, abundant or dominant). Populations of species of the genera Salmo, Thymallus, Esox, Barbus and Rutulus non hybridizing with allochthonous populations.

B) All populations well-structured in age classes, and with sufficient or good abundances. One or more populations of species of the genera Salmo, Thymallus, Esox, Barbus and Rutulus hybridizing with allochthonous populations.

C) Most of the populations (more than 50%) well-structured in age classes, and with sufficient or good abundances.

D) Less than 50% of the populations well-structured in age classes, and with sufficient or good abundances.
Tab. 9. Conversion table of the ISECI values into levels of the Index of Ecological Status of Fish Communities (Zerunian 2007).

<table>
<thead>
<tr>
<th>Ecological status level</th>
<th>ISECI value</th>
<th>Synthetic judgement</th>
<th>Thematic colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>≥ 14</td>
<td>high</td>
<td>blue</td>
</tr>
<tr>
<td>II</td>
<td>11 - 13</td>
<td>good</td>
<td>green</td>
</tr>
<tr>
<td>III</td>
<td>8 - 10</td>
<td>sufficient</td>
<td>yellow</td>
</tr>
<tr>
<td>IV</td>
<td>5 - 7</td>
<td>poor</td>
<td>orange</td>
</tr>
<tr>
<td>V</td>
<td>2-4</td>
<td>bad</td>
<td>red</td>
</tr>
</tbody>
</table>

The application of the ISECI requires defining the expected (potential) fish community for each of the sampling sites, i.e. the community expected if disturbance did not occur in the sampled water course.

The potential communities, assessed with regard to the ichthyogeographic region and the eco-morphological characteristics of each water course, are listed in tab. 10.

Tab. 10. Expected fish communities for the water courses of the Vincheto di Celarda Nature Reserve.

<table>
<thead>
<tr>
<th>Water course</th>
<th>Expected fish communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piave River</td>
<td>marble trout, grayling, bullhead, common barbel, chub, minnow, eel, Po brook lamprey</td>
</tr>
<tr>
<td>Torrente Caorame</td>
<td>marble trout, grayling, bullhead, common barbel, minnow</td>
</tr>
<tr>
<td>Rio Caoramello</td>
<td>brown trout, minnow, bullhead</td>
</tr>
<tr>
<td>Rio Celarda</td>
<td>marble trout, brown trout, bullhead, chub, common barbel, minnow, stroemling, Po brook lamprey, eel</td>
</tr>
</tbody>
</table>

The values of the ISECI Index calculated for the observed fish communities of the water courses are listed in tab. 11. The observed fish community is the first entry in the table, whereas the biological status of the examined populations is the second entry.

Tab. 11. ISECI values of the fish communities of the Vincheto di Celarda Nature Reserve water courses.

<table>
<thead>
<tr>
<th>Water course</th>
<th>ISECI value</th>
<th>Synthetic judgement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piave River</td>
<td>9</td>
<td>sufficient</td>
</tr>
<tr>
<td>Torrente Caorame</td>
<td>9</td>
<td>sufficient</td>
</tr>
<tr>
<td>Rio Celarda</td>
<td>9</td>
<td>sufficient</td>
</tr>
<tr>
<td>Rio Caoramello - site 2</td>
<td>6</td>
<td>poor</td>
</tr>
<tr>
<td>Rio Caoramello - site 3</td>
<td>10</td>
<td>sufficient</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Data collected in this study allowed a satisfactory description of the status of the fish communities at Vincheto di Celarda Nature Reserve. Fish populations are generally in good conditions but there are evident signs of ecological stress, which prevents reaching the optimal condition for the reserve (which should be the condition expected for a natural reserve).

In conclusion, the calculation of the Index of Ecological Status of Fish Communities resulted in the following evaluation:

1. the calculated ISECI of the Piave River (=9) indicates a sufficient ecological status for the fish communities. The evaluated status is influenced by differences between the observed and the expected community composition and species abundances, such as the lack of the endemic Po brook lamprey (*Lampetra zanandreai*), already rare in this section of the Piave River and currently affected by channelization, which eliminates the habitats near the banks which are typically used by the species. The calculated status is also affected by i) the lack of eel (*Anguilla anguilla*), once frequent in the Piave but whose migration upstream is today hindered by several transversal barriers present in the river;
ii) the hybridization rate of the autochthonous salmonids; iii) the poor structured composition in age class of the salmonids. The lack of adults in the salmonid populations are linked to the channelization and regulation of the riverbanks which eliminates pools that are the most suitable habitats for the adults.

2. the calculated ISECI of the Torrente Caorame (=9) indicates a sufficient ecological status for the fish communities. Also in this case, the evaluation is influenced by differences between the observed and the expected community composition and species abundances. The common barbel (*Barbus plebejus*), an Italian endemism, is not present. The autochthonous salmonids hybridize with allochthonous stocks.

3. the calculated ISECI of the Rio Celarda (=9) indicates a sufficient ecological status for the fish communities. Differences in the observed community composition and species abundances compared to the expected ones are represented by the absence of marble trout (*Salmo trutta marmoratus*) and eel (*Anguilla anguilla*), and the presence of individuals of brown trout (*Salmo trutta trutta*) from allochthonous stocks.

4. the calculated ISECI for the Rio Caoramello (=6) is poor for the upstream site, and sufficient (=10) for the downstream site. Variations in the observed community composition and species abundances compared to the ones expected are present; they are stronger for the upstream site where a monospecific population of allochthonous brown trout is present.

References


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