Double Whammy in the San Francisco Estuary: Smaller mysids and less of them
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Introduction

- Mysids are an important trophic link between smaller zooplankton, such as copepods and cladocerans, and fish in the upper San Francisco Estuary. Mysids provide a valuable food resource for many fishes including striped bass, longfin smelt, juvenile sturgeon, and American shad.
- The California Department of Fish and Game’s (DFG) Zooplankton Study monitors mysid abundance in the upper estuary, which has been declining since 1987.
- Neomysis mercedis was historically the most abundant mysid throughout the upper estuary until a severe population crash in the 1990s.
- Hyperacanthomysis longirostris (formerly Acanthomysis dawsonii) is an introduced mysid first detected in 1993, and has been the most abundant mysid in the upper estuary since summer 1995.
- The now numerically dominant mysid H. longirostris is smaller than N. mercedis, with much lower abundance than historical N. mercedis abundance.

Results

- H. longirostris is smaller, on average, than N. mercedis. H. longirostris weighs more than N. mercedis at the same length. H. longirostris matures at a smaller size and does not get as large as N. mercedis. The average N. mercedis adult (Figure 2) is approximately 3mm longer than H. longirostris, and provides about twice as much carbon (Table 1).
- Species replacement of N. mercedis by the smaller H. longirostris has resulted in a sharper decline in biomass than abundance (Figures 3 and 4).
- Although mysid biomass has declined in all regions of the upper San Francisco Estuary, the east and central delta have declined more than the west delta and Suisun (Figure 3).

Discussion

- Although the introduced mysid H. longirostris has replaced the native mysid N. mercedis as the most abundant mysid in the upper San Francisco Estuary, densities of H. longirostris are much lower than the historical N. mercedis.
- The introduced H. longirostris is also smaller than N. mercedis, thereby providing less biomass for fishes, such as longfin smelt, that depend on this important food source.
- Before the population crash in the 1990s, the native mysid N. mercedis was abundant throughout the upper San Francisco Estuary, whereas its replacement H. longirostris has highest densities in Suisun and the western delta and very low densities in the central and eastern portions of the delta.
- Fish that depend on mysids in the upper San Francisco Estuary face a double whammy: not only are there fewer mysids available, but the ones available are also smaller. So fish are getting less bang for their buck!

Acknowledgements

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References


Table 1. Mean length and biomass of N. mercedis and H. longirostris

<table>
<thead>
<tr>
<th>Species</th>
<th>Juvenile Mean length (mm)</th>
<th>Juvenile Biomass (mg carbon)</th>
<th>Adult Mean length (mm)</th>
<th>Adult Biomass (mg carbon)</th>
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<tr>
<td>Neomysis mercedis</td>
<td>4.1</td>
<td>0.05</td>
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<td>Hyperacanthomysis longirostris</td>
<td>3.3</td>
<td>0.06</td>
<td>7.8</td>
<td>0.43</td>
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</tbody>
</table>

Figure 1. Map of DFG Zooplankton Study sampling stations with regions

Figure 2. Average size of adult native N. mercedis (top) and introduced H. longirostris (bottom)

Figure 3. Annual abundance (log of CPUE+1) of mysids by species, 1974-2010

Figure 4. Annual biomass (log of BPUE+1) of mysids by species, 1974-2010