Advisory Council on the Environment
Nature Conservation Subcommittee

The Proposed Action Plan for the
Conservation of Freshwater Fish in Hong Kong

Purpose

This paper briefs Members on the proposed action plan for the conservation of freshwater fish in Hong Kong.

Background

2. Freshwater fish refers to species that occur in freshwater environments either occasionally or permanently. They comprise primary freshwater species, brackish species, diadromous species and marine vagrants.

3. Primary freshwater fish are strictly confined to freshwater environments in their entire life cycle. Brackish species usually occur in estuaries but visit freshwater environments for food and shelter during low tide. Marine vagrants are species which spawn and spend most of their lives in coastal or oceanic waters, but may venture into freshwater environments occasionally. Diadromous fish migrate between marine and freshwater environments in different stages of their lives.

4. The Agriculture, Fisheries and Conservation Department (AFCD) has initiated a biodiversity survey programme since 2002 for the purpose of collecting essential and up-to-date information on the diversity, abundance and distribution of the flora and fauna of Hong Kong. The programme includes a territory-wide survey on the diversity and distribution of freshwater fish of Hong Kong. The findings are being used for drawing up an action plan for the freshwater fish so as to enhance their conservation.

Diversity and Distribution

5. Hong Kong is a small territory at the edge of the northern tropical zone with a total land area of about 1095 km$^2$. The local landscape is dominated by hills and ravines interlaced with hundreds of fast flowing rocky streams. Long and meandering rivers are limited in number and confined to the floodplains of the northern and northwestern New Territories. Although Hong Kong is small in geographical coverage, it is surprisingly rich in freshwater fish species. There are 185 species of freshwater fish recorded in Hong Kong, accounting for about 18% of the over 1000 freshwater fish species occurring in China. This is mainly attributed to the presence of a wide range of habitats providing suitable foraging grounds and breeding sites for them.

6. The territory-wide surveys conducted by AFCD during the period from 2002 to 2010 provided essential and updated information on the distribution and relative abundance of the
freshwater fish. Since the commencement of the survey, about 800 numbers of surveys were conducted at 250 localities recording a total of 133 freshwater fish species. The conservation status of all the 185 freshwater fish species was reviewed. Some species such as Hong Kong Paradise Fish and Rice Fish which had once been thought to be rare were found to be more widespread and abundant. However, some species are still considered to be of restricted distribution throughout the territory, like Rose Bitterlings which requires the presence of a particular species of freshwater mussel, *Anodonta woodiana*, for reproduction.

**Species of Conservation Concern**

7. Amongst the 185 species of freshwater fish recorded in Hong Kong, 21 of them were considered to have conservation concern based on our survey results and literature records (Annex 1). They all have restricted distribution in the territories. Among the 21 species of conservation concern, 16 are primary freshwater species while the remaining five are estuarine fishes. Four of the primary freshwater species are of unknown distribution and could not be found in any of our past surveys. These include Chinese Spiny Loach, Garnet Minnow, White Cloud Mountain Minnow and White-line Chest-sculptured Sisoridfish.

8. Garnet Minnow and White Cloud Mountain Minnow were once reported in streams in the northern New Territories but have not been recorded for decades. The last record of Chinese Spiny Loach dated back to 1990 with a single observational record at Sai Kung which may be an occasional record. The latest record of White-line Chest-sculptured Sisoridfish dated back to 2001, which was found at Tai Po. The local status of these species awaits further confirmation.

**Sites of Conservation Importance**

9. In addition to providing information on freshwater species of conservation concern, the survey findings also help in identification of sites of conservation importance to freshwater fish where a total of 37 sites were identified. These sites are either harbouring freshwater fish species of conservation concern and/or characterized by high species diversity of freshwater fish. These sites should be properly protected or managed for conservation of their freshwater fish communities. A list of sites of conservation importance for freshwater fish is given at Annex 2 and a location map of these sites is attached at Annex 3.

**Threats**

10. Freshwater fish are declining rapidly in population numbers and diversity around the world. Threats such as habitat loss, habitat degradation, pollution, climate change, over-harvesting and the presence of exotic species may endanger the survival of freshwater fish and contribute to their decline.

**Conservation Action Plan**

11. According to the survey findings and analysis done on native freshwater fish, we are drawing up an action plan for the freshwater fish of conservation concern. The action plan comprises various components including habitat protection, site monitoring, species action
plan, studies as well as education and publicity in order to provide a sustainable long-term conservation programme for native freshwater fish.

**Habitat Protection and Enhancement**

12. Many of the identified sites of conservation importance for freshwater fish fall either exclusively or partially within protected areas such as Country Parks, Sites of Special Scientific Interest (SSSI) and Conservation Areas. These areas are being protected from incompatible development and human activities. For example, Lin Ma Hang, one of the two known localities of Chinese Rasbora, was designated as SSSI in 2007. Tai Ho, a breeding site of the rare Ayu and a site of high diversity of fish species, was designated as SSSI in 1999.

13. Apart from rendering streams with suitable zonings for protection, streams with freshwater fish of conservation concern or a high diversity of fish species may also be listed as Ecologically Important Stream (EIS). Listing of a stream as EIS would help to alert project proponents, both from government departments and private sectors, the ecological importance of the concerned stream. This would facilitate project proponents to design and implement their projects in an environmentally responsible manner with appropriate mitigation measures to avoid or minimize any adverse impacts so caused.

14. To maintain freshwater fish of conservation concern with viable populations throughout the territory, we have enhanced/rehabilitated some abandoned wetlands in protected areas as suitable habitats for their introduction. For example, a piece of abandoned agricultural land at Tai Tong within Tai Lam Country Park was enhanced as a pond for introduction of Chinese Rasbora; an overgrown marsh within Tai Tam Country Park was rehabilitated for introduction of Beijiang Thick-lipped Barb.

**Monitoring of Sites of Conservation Importance**

15. A total of 37 sites were identified having conservation importance to freshwater fish. These sites are visited regularly for monitoring of their general conditions as habitats for the species of conservation concern and/or the diverse fish community therein. During monitoring visits, special attention would be paid to occurrence of any environmental changes and irregularities which may affect the fish community and the quality of its habitats. The species richness and abundance of freshwater fish are also recorded during the visits to these sites.

**Species Action Plan**

16. To safeguard the freshwater fish species of the highest conservation concern, species action plans are devised for meeting their specific conservation needs. In general, a species action plan includes an inventory of biological information, an assessment on conservation status, and the conservation objectives for a target species as well as implementation schedule. At present, draft species action plans have been developed for Rose Bitterling, Chinese Rasbora and Taiwan Lesser Bream. The major conservation efforts for these species include population monitoring, captive breeding, exploration of suitable translocation sites and trial establishment of captive bred population at translocation sites. Consultation with relevant
experts/organizations on the proposed species conservation measures would be arranged prior to implementation.

**Studies**

17. Although freshwater fish could be found in many water bodies throughout the territory, fish communities at different localities are probably segregated from each other physically for a long time, which may lead to genetic variation among different fish populations of the same species. In order to better understand the population structure of freshwater fish of Hong Kong, AFCD is in collaboration with the Chinese University of Hong Kong to carry out a study on the genetics of selected native freshwater fish species throughout the territory. For proper maintenance on the sustainability of freshwater fish species, conserving their genetic diversity and abundance are of equal importance. The result of this study would provide further insights on research and conservation work on freshwater fish of Hong Kong in future.

**Education and Publicity**

18. Public education plays an important role in conservation. Various educational and publicity programmes have been held on the conservation of freshwater fish. For example, AFCD and RTHK produced a TV programme introducing the Hong Kong freshwater fish in 2003. In 2006, AFCD and Ocean Park held a native species educational display programme which attracted a considerable number of visitors. Up-to-date, part of the display programme is still ongoing in Ocean Park in the Chinese Sturgeon Aquarium. Besides, in mid 2010, AFCD jointly organized with LCSD an exhibition on the diverse flora and fauna of Hong Kong including some freshwater fish of conservation concern at the Science Museum. In addition, AFCD and the Friends of Country Parks published two field guides on freshwater fish in 2002 and 2004 respectively to raise public awareness about the importance of freshwater fish conservation. Further educational and publicity programmes would be arranged with relevant parties to enhance public understanding of our local freshwater fish diversity and arouse public awareness of the conservation needs of our freshwater fish community.

**Advice Sought**

19. Members are invited to note and comment on the proposed action plan for the conservation of freshwater fish of Hong Kong.

Agriculture, Fisheries and Conservation Department
April 2011
### Annex 1

**List of Freshwater Fish Species of Conservation Concern in Hong Kong**

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Chinese Name</th>
<th>Common Name</th>
<th>Conservation Status</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Acrossocheilus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>beijiangensis</em></td>
<td>北江光唇魚</td>
<td>Beijiang Thick-lipped Barb</td>
<td>Global Concern</td>
<td>• Recorded at Lantau and Hong Kong Island</td>
</tr>
<tr>
<td><em>Acrossocheilus</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>parallens</em></td>
<td>側條光唇魚</td>
<td></td>
<td>Global Concern</td>
<td>• Recorded at Hong Kong Island, Tuen Mun and Tai Po</td>
</tr>
<tr>
<td><em>Anguilla marmorata</em></td>
<td>花鰻鱺</td>
<td>Giant Mottled Eel</td>
<td>Global Concern</td>
<td>• China Red Data Book: Endangered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• China Species Red List: Endangered</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• List of State Key Protected Wildlife in China: Class II Protected Animal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Recorded at Lantau, Sai Kung and Tsuen Wan</td>
</tr>
<tr>
<td><em>Aphyocypris lini</em></td>
<td>林氏細鯽</td>
<td>Garnet Minnow</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Awaous melanocephalus</em></td>
<td>黑首阿胡鰕虎魚</td>
<td>Large Snout Goby</td>
<td>Regional Concern</td>
<td>• Locally restricted to Hong Kong Island and Lantau</td>
</tr>
<tr>
<td><em>Cobitis sinensis</em></td>
<td>中華鰍</td>
<td>Chinese Spiny Loach</td>
<td></td>
<td>• Last recorded at Sai Kung in 1990</td>
</tr>
<tr>
<td><em>Glyptothorax pallazonum</em></td>
<td></td>
<td>White-line Chest-sculptured</td>
<td>Global Concern</td>
<td>• Last recorded at Tai Po in 2001</td>
</tr>
<tr>
<td><em>Macropodus hongkongensis</em></td>
<td></td>
<td>Hong Kong Paradise Fish</td>
<td>Global Concern</td>
<td>• Recorded at Sai Kung and Northeast New Territories</td>
</tr>
<tr>
<td><em>Mastacembelus armatus</em></td>
<td>大刺鰍</td>
<td>Spiny Eel</td>
<td>Local Concern</td>
<td>• Recorded at Northeast New Territories</td>
</tr>
<tr>
<td><em>Oryzias curvinotus</em></td>
<td>弓背青鱂</td>
<td>Rice Fish</td>
<td>Global Concern</td>
<td>• Recorded at Lantau, Sai Kung and New Territories</td>
</tr>
<tr>
<td><em>Plecoglossus altivelis</em></td>
<td>香魚</td>
<td>Ayu</td>
<td>Regional Concern</td>
<td>• China Red Data Book: Vulnerable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Recorded at Lantau</td>
</tr>
<tr>
<td><em>Pseudobagrus trilineatus</em></td>
<td></td>
<td>Three-lines Bagrid Fish</td>
<td>Global Concern</td>
<td>• China Species Red List: Vulnerable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Recorded at Sai Kung and Tai Po</td>
</tr>
<tr>
<td><strong>Rasbora steineri</strong></td>
<td>斯氏波魚</td>
<td>Chinese Rasbora</td>
<td>Global Concern</td>
<td>♦ Recorded at Northeast and Northwest New Territories</td>
</tr>
<tr>
<td>----------------------</td>
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</tr>
<tr>
<td><strong>Rasborinus formosae</strong></td>
<td>台細鯿</td>
<td>Taiwan Lesser Bream</td>
<td>Global Concern</td>
<td>♦ China Species Red List: Vulnerable ♦ Recorded at Central New Territories</td>
</tr>
<tr>
<td><strong>Rasborinus lineatus</strong></td>
<td>線細鯿</td>
<td>Striped Lesser Bream</td>
<td>Global Concern</td>
<td>♦ Recorded at Central New Territories and Tai Po</td>
</tr>
<tr>
<td><strong>Rhinogobius cervicosquamus</strong></td>
<td>項鱗吻鰕虎魚</td>
<td>Barcheek Goby</td>
<td>Global Concern</td>
<td>♦ Recorded at Central New Territories and Tai Po</td>
</tr>
<tr>
<td><strong>Rhodeus ocellatus</strong></td>
<td>高體鰟鮍</td>
<td>Rose Bitterling</td>
<td>Local Concern</td>
<td>♦ Recorded at Central New Territories</td>
</tr>
<tr>
<td><strong>Schistura incerta</strong></td>
<td>無斑南鰍</td>
<td>Inmacular Loach</td>
<td>Local Concern</td>
<td>♦ Recorded at Hong Kong Island, Sha Tin and Tai Po</td>
</tr>
<tr>
<td><strong>Stiphodon atropurpureum</strong></td>
<td>菲律賓枝牙鰕虎魚</td>
<td>Philippine Neon Goby</td>
<td>Global Concern</td>
<td>♦ Recorded at Lantau, Sai Kung and New Territories</td>
</tr>
<tr>
<td><strong>Stiphodon cf. multisquamus</strong></td>
<td>多鱗枝牙鰕虎魚</td>
<td></td>
<td>Global Concern</td>
<td>♦ China Species Red List: Endangered ♦ Recorded at Lantau, Sai Kung and New Territories</td>
</tr>
<tr>
<td><strong>Tanichthys albonubes</strong></td>
<td>唐魚</td>
<td>White Cloud Mountain Minnow</td>
<td></td>
<td>♦ China Red Data Book: Extinct in the wild ♦ China Species Red List: Extinct in the wild ♦ List of State Key Protected Wildlife in China: Class II Protected Animal ♦ Last recorded at Sai Kung in 1980s</td>
</tr>
</tbody>
</table>

* Notes:
**Annex 2**

**List of Sites of Conservation Importance for the Freshwater Fish of Hong Kong**

<table>
<thead>
<tr>
<th>No.</th>
<th>Site</th>
<th>Protection Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cheung Po, Northeast New Territories</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>2</td>
<td>Cheung Sheung, Sai Kung</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>3</td>
<td>Deep Water Bay Valley, Hong Kong Island</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>4</td>
<td>Double Island, Northeast New Territories</td>
<td>Within Plover Cove Country Park</td>
</tr>
<tr>
<td>5</td>
<td>Ham Tin Stream, Sai Kung</td>
<td>Within Conservation Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>6</td>
<td>Hoi Ha Stream, Sai Kung</td>
<td>Partly within the Sai Kung West Country Park</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>7</td>
<td>Kau Lung Hang, Tai Po</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>8</td>
<td>Kowloon Reception Reservoir, Central New Territories</td>
<td>Within Kam Shan Country Park</td>
</tr>
<tr>
<td>9</td>
<td>Kuk Po, Northeast New Territories</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>10</td>
<td>Lai Chi Chong, Sai Kung</td>
<td>Partly within the Sai Kung West Country Park</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>11</td>
<td>Lam Tsuen River, Tai Po</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>12</td>
<td>Lau Shui Heung Reservoir, Northeast New Territories</td>
<td>Within Pat Sin Leng Country Park</td>
</tr>
<tr>
<td>13</td>
<td>Lin Ma Hang, Northeast New Territories</td>
<td>Within Lin Ma Hang Stream SSSI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>14</td>
<td>Pak Tam Chung, Sai Kung</td>
<td>Partly within Sai Kung East Country Park and Coastal Protection Area</td>
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<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>15</td>
<td>Pui O, Lantau</td>
<td>Largely within Coastal Protection Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>16</td>
<td>Sha Lo Tung, Tai Po, Northeast New Territories</td>
<td>Within Sha Lo Tung SSSI &amp; Conservation Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>17</td>
<td>Sam A Tsuen, Northeast New Territories</td>
<td>Outside protected area</td>
</tr>
<tr>
<td>18</td>
<td>Sham Chung, Sai Kung</td>
<td>Within Conservation Area and Coastal Protection Area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>19</td>
<td>Sham Wat, Lantau</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>20</td>
<td>Shap Long Irrigation Reservoir and its catchments, Lantau</td>
<td>Largely within Lantau South Country Park</td>
</tr>
<tr>
<td>21</td>
<td>Shek Pik Reservoir and its catchments, Lantau</td>
<td>Within Lantau South Country Park</td>
</tr>
<tr>
<td>22</td>
<td>Sheung Ha Tsat Muk Kiu, Northeast New Territories</td>
<td>Within Pat Sin Leng Country Park</td>
</tr>
<tr>
<td>23</td>
<td>So Lo Pun, Plover Cove,</td>
<td>Ecologically Important Stream</td>
</tr>
<tr>
<td>No.</td>
<td>Location</td>
<td>Details</td>
</tr>
<tr>
<td>-----</td>
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<td>---------</td>
</tr>
</tbody>
</table>
| 24  | Tai Ho, Lantau | Tai Ho Stream SSSI  
Ecologically Important Stream |
| 25  | Tai Lam Chung Reservoir, Tuen Mun | Within Tai Lam Country Park |
| 26  | Tai Lang Shui, Tuen Mun | Outside protected area |
| 27  | Tai Tam Tuk Reservoir catchments, Hong Kong Island | Within Tai Tam Country Park |
| 28  | Tai Tam Upper Reservoir catchments, Hong Kong Island | Within Tai Tam Country Park |
| 29  | Tai Tan, Sai Kung | Partly within Sai Kung West Country Park  
Ecologically Important Stream |
| 30  | Tan Shan River, Northeast New Territories | Ecologically Important Stream |
| 31  | Tong Fuk, Lantau | Partly within Coastal Protection Area  
Ecologically Important Stream |
| 32  | Tung Chung Stream, Lantau | Ecologically Important Stream |
| 33  | Wong Lung Hang, Lantau | Partly within Lantau North Country Park  
Ecologically Important Stream |
| 34  | Wu Kau Tang, Northeast New Territories | Largely within Conservation Area and partly within Plover Cove Country Park  
Ecologically Important Stream |
| 35  | Wun Yiu, Tai Po | Ecologically Important Stream |
| 36  | Yung Shue Au, Northeast New Territories | Ecologically Important Stream |
| 37  | Yung Shue O, Sai Kung | Ecologically Important Stream |
Location Map of Sites of Conservation Importance for the Freshwater Fish of Hong Kong