NEW YORK
FISH & AQUATIC INVERTEBRATE INVASIVENESS RANKING FORM

Scientific name: Ctenopharyngodon idella (diploid only)
Common names: Grass Carp, White Amur, Diploid Grass Carp
Native distribution: Eastern and Northwestern China, Southeastern Russia
Date assessed: 1/8/2013
Assessors: E. Schwartzberg

New York Invasiveness Rank: Moderate (Relative Maximum Score 50.00-69.99)

<table>
<thead>
<tr>
<th>Status of this species in each PRISM:</th>
<th>Current Distribution</th>
<th>PRISM Invasiveness Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Adirondack Park Invasive Program</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>2 Capital/Mohawk</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>3 Catskill Regional Invasive Species Partnership</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>4 Finger Lakes</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>5 Long Island Invasive Species Management Area</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>6 Lower Hudson</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>7 Saint Lawrence/Eastern Lake Ontario</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
<tr>
<td>8 Western New York</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

**Invasiveness Ranking Summary**
(see details under appropriate sub-section)

<table>
<thead>
<tr>
<th></th>
<th>Total (Total Answered*)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ecological impact</td>
<td>30 (30)</td>
<td>30</td>
</tr>
<tr>
<td>2 Biological characteristic and dispersal ability</td>
<td>30 (30)</td>
<td>22</td>
</tr>
<tr>
<td>3 Ecological amplitude and distribution</td>
<td>30 (23)</td>
<td>8</td>
</tr>
<tr>
<td>4 Difficulty of control</td>
<td>10 (10)</td>
<td>4</td>
</tr>
<tr>
<td>Outcome score</td>
<td>100 (93)(^b)</td>
<td>64(^a)</td>
</tr>
<tr>
<td>Relative maximum score (^\dagger)</td>
<td></td>
<td>68.82</td>
</tr>
<tr>
<td>New York Invasiveness Rank (^\S)</td>
<td>Moderate (Relative Maximum Score 50.00-69.99)</td>
<td></td>
</tr>
</tbody>
</table>

* For questions answered “unknown” do not include point value in “Total Answered Points Possible.” If “Total Answered Points Possible” is less than 70.00 points, then the overall invasive rank should be listed as “Unknown.”
\(^\dagger\) Calculated as 100(a/b) to two decimal places.
\(^\S\) Very High >80.00; High 70.00–80.00; Moderate 50.00–69.99; Low 40.00–49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented in NY? (reliable source; voucher not required)
- Yes – continue to A1.2
- No – continue to A2.1; Yes NA; Yes USA

A1.2. In which PRISMs is it known (see inset map)?
- Adirondack Park Invasive Program
- Capital/Mohawk
- Catskill Regional Invasive Species Partnership
- Finger Lakes
- Long Island Invasive Species Management Area
- Lower Hudson
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[Western New York]

Documentation:
Sources of information:
We are not sure if these are diploid or triploid. For purposes of this question, it has been assumed they are diploid. NAS, 2013.

A2.0. Is this species listed on the Federal Injurious Fish and Wildlife list?
- Yes – the species will automatically be listed as Prohibited, no further assessment required.
- No – continue to A2.1

A2.1. What is the likelihood that this species will occur and persist given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form and/or Climatch score)
Not Assessed Adirondack Park Invasive Program
Not Assessed Capital/Mohawk
Not Assessed Catskill Regional Invasive Species Partnership
Not Assessed Finger Lakes
Not Assessed Long Island Invasive Species Management Area
Not Assessed Lower Hudson
Not Assessed Saint Lawrence/Eastern Lake Ontario
Not Assessed Western New York

Documentation:
Sources of information (e.g.: distribution models, literature, expert opinions):
If the species does not occur and is not likely to survive and reproduce within any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank from PRISM invasiveness ranking forms)

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Adirondack Park Invasive Program</th>
<th>Capital/Mohawk</th>
<th>Catskill Regional Invasive Species Partnership</th>
<th>Finger Lakes</th>
<th>Long Island Invasive Species Management Area</th>
<th>Lower Hudson</th>
<th>Saint Lawrence/Eastern Lake Ontario</th>
<th>Western New York</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

Documentation:
Sources of information:

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats
- Marine
- Salt/brackish waters
- Freshwater tidal
- Rivers/streams
- Natural lakes and ponds
- Vernal pools
- Reservoirs/impoundments*

Wetland Habitats
- Salt/brackish marshes
- Freshwater marshes
- Peatlands
- Shrub swamps
- Forested wetlands/riparian
- Ditches*
- Beaches/or coastal dunes

Upland Habitats
- Cultivated*
- Grasslands/old fields
- Shrublands
- Forests/woodlands
- Alpine
- Roadside*
- Cultural*

Other potential or known suitable habitats within New York:
Backwaters of large rivers, demersal (bottom dwellers), potamodromous (migrate within freshwater only).

Documentation:
Sources of information:
Fish & Aquatic Invertebrate Invasiveness Ranking Form

FishBase, 2013.

B. INVASIVENESS RANKING
   1. ECOLOGICAL IMPACT

1.1. Impact on Ecosystem Processes and System-wide Parameters (e.g., water cycle, energy cycle, nutrient and mineral dynamics, light availability, or geomorphological changes (erosion and sedimentation rates).

   A. No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years. 0

   B. Influences ecosystem processes to a minor degree, has a perceivable but mild influence 3

   C. Significant alteration of ecosystem processes 7

   D. Major, possibly irreversible, alteration or disruption of ecosystem processes 10

   U. Unknown

   Score 10

   Documentation:
   Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
   Grass carp have been used extensively for biological control of aquatic macrophytes resulting from eutrophication (NAS, 2013). Macrophytes are known to affect many system wide parameters (Carpenter and Lodge, 1986). As such, grass carp herbivory on macrophytes impacts a variety of system-wide parameters (Dibble and Kovalenko, 2009).
   Sources of information:

1.2. Impact on Natural Habitat/ Community Composition

   A. No perceived impact; causes no apparent change in native populations 0

   B. Influences community composition (e.g., reduces the number of individuals of one or more native species in the community) 3

   C. Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community) 7

   D. Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community) 10

   U. Unknown

   Score 10

   Documentation:
   Identify type of impact or alteration:
   Directly affects aquatic plant (macrophytes) abundance and habitat heterogeneity, and indirectly affects community structure, macroinvertebrate populations, fish and other aquatic vertebrates, and water quality.
   Sources of information:

1.3. Impact on other species or species groups, including cumulative impact of this species on other organisms in the community it invades. (e.g., interferes with native predator/ prey dynamics; injurious components/ spines; reduction in spawning; hybridizes with a native species; hosts a non-native disease which impacts a native species)

   A. Negligible perceived impact 0

   B. Minor impact (e.g. impacts 1 species, <20% population decline, limited host damage) 3
### 2. Biological Characteristics and Dispersal Ability

**2.1. Mode and Rate of Reproduction**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No reproduction (e.g., sterile with no sexual or asexual reproduction).</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Limited reproduction (e.g., intrinsic rate of increase &lt;10%, low fecundity, complete one life cycle)</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>Moderate reproduction (e.g., intrinsic rate of increase between 10-30%, moderate fecundity, complete 2-3 life cycles)</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>Abundant reproduction (e.g., intrinsic rate of increase &gt;30%, parthenogenesis, large egg masses, complete &gt;3 life cycles)</td>
<td>4</td>
</tr>
<tr>
<td>U</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**

Describe key reproductive characteristics:

For diploid: Lay up to 1000 eggs, very fecund, but successful reproduction thought to occur in only a few locations. Triploid are sterile. D has been chosen because this assessment is for diploid grass carp.

Sources of information:

Stanley et al., 1978.

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**2.2. Migratory Behavior**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Always migratory in its native range</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Non-migratory or facultative migrant in its native range</td>
<td>2</td>
</tr>
<tr>
<td>U</td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**

Describe migratory behavior:

Can move up to 500 km within first two years, but not considered migratory.

Sources of information:

Stitch, 2011.

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**2.3. Biological Potential for Colonization by Long-distance Dispersal/Movement**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No long-distance dispersal/movement mechanisms</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>Adaptations exist for long-distance dispersal, but studies report that most individuals (90%) establish territories within 5 miles of natal origin or within a distance twice the home range of the typical individual, and tend not to cross major barriers such as dams and watershed divides</td>
<td>1</td>
</tr>
</tbody>
</table>
C. Adaptations exist for long-distance dispersal, movement and evidence that offspring often disperse greater than 5 miles of natal origin or greater than twice the home range of typical individual and will cross major barriers such as dams and watershed divides

U. Unknown

Score 2

Documentation:
Identify dispersal mechanisms:
Can move up to 500 km, or 200 m per day in their second year.
Sources of information:
Stitch, 2011.

2.4. Practical potential to be spread by human activities, both directly and indirectly – possible vectors include: commercial bait sales, deliberate illegal stocking, aquaria releases, boat trailers, canals, ballast water exchange, live food trade, rehabilitation, pest control industry, aquaculture escapes, etc.)

A. Does not occur 0
B. Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient) 1
C. Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent) 2
D. High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful) 4

U. Unknown

Score 0

Documentation:
Identify dispersal mechanisms:
Triploid individuals are moved around the world and introduced for biological control of macrophytes, but diploid individuals are not. This assessment is for diploi individuals only.
Sources of information:

2.5. Non-living chemical and physical characteristics that increase competitive advantage (e.g., tolerance to various extremes, pH, DO, temperature, desiccation, fill vacant niche, charismatic species)

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 4
C. Possesses two or more characteristics that increase competitive advantage 8

U. Unknown

Score 8

Documentation:
Evidence of competitive ability:
Can withstand ranges in water conditions of 125-215 ppm turbidity, 1-28 ppm for dissolved oxygen, pH from 5-9, and 7.5% to 12.0% salinity.
Sources of information:
Aquaculture/Fisheries Center, 2013; Shireman and Smith, 1983.

2.6. Biological characteristics that increase competitive advantage (e.g., high fecundity, generalist/ broad niche space, highly evolved defense mechanisms, behavioral adaptations, piscivorous, etc.)

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 4
C. Possesses two or more characteristics that increase competitive advantage 8

U. Unknown
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<table>
<thead>
<tr>
<th>Documentation:</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of competitive ability:</td>
<td>4</td>
</tr>
<tr>
<td>High fecundity.</td>
<td></td>
</tr>
<tr>
<td>Sources of information:</td>
<td></td>
</tr>
<tr>
<td>Stanley et al., 1978.</td>
<td></td>
</tr>
</tbody>
</table>

2.7. Other species in the family and/ or genus invasive in New York or elsewhere?

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No</td>
<td>0</td>
</tr>
<tr>
<td>B. Yes</td>
<td>2</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Identify species:
Several invasive species in the family Cyprinidae, including silver carp, black carp, bighead carp.

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Current introduced distribution in the northern latitudes of USA and southern latitude of Canada (e.g., between 35 and 55 degrees).

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Not known from the northern US or southern Canada.</td>
<td>0</td>
</tr>
<tr>
<td>B. Established as a non-native in 1 northern USA state and/or southern Canadian province.</td>
<td>1</td>
</tr>
<tr>
<td>C. Established as a non-native in 2 or 3 northern USA states and/or southern Canadian provinces.</td>
<td>2</td>
</tr>
<tr>
<td>D. Established as a non-native in 4 or more northern USA states and/or southern Canadian provinces, and/or categorized as a problem species (e.g., “Invasive”) in 1 northern state or southern Canadian province.</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Identify states and provinces:
Breeding populations of grass carp established in MN, IL, MS, KY, TN, AK, MI, TX.
Sources of information:
- See known introduced range at www.usda.gov, and update with information from states and Canadian provinces.
NAS, 2013.

3.2. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Established in none of the PRISMs</td>
<td>0</td>
</tr>
<tr>
<td>B. Established in 1 PRISM</td>
<td>1</td>
</tr>
<tr>
<td>C. Established in 2 or 3 PRISMS</td>
<td>3</td>
</tr>
<tr>
<td>D. Established in 4 or more PRISMS</td>
<td>5</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

**Documentation:**
Describe distribution:
Unknown selected. Grass carp present in all PRISMs except SLELO, but we do not know if
3.3. Number of known, or potential (each individual possessed by a vendor or consumer), individual releases and/or release events

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. None</td>
<td>0</td>
</tr>
<tr>
<td>B. Few releases (e.g., &lt;10 annually).</td>
<td>2</td>
</tr>
<tr>
<td>C. Regular, small scale releases (e.g., 10-99 annually).</td>
<td>4</td>
</tr>
<tr>
<td>D. Multiple, large scale (e.g., ≥100 annually).</td>
<td>6</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Documentation:
Describe known or potential releases:
It is illegal to release diploid grass carp. Triploid grass carp are commonly released throughout the United States, including in New York State (NYSDEC, 2013). Option A was selected for this question because this assessment is limited to diploid grass carp.
Sources of information:
NYSDEC, 2013.

3.4. Current introduced population density, or distance to known occurrence, in northern USA and/or southern Canada.

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. No known populations established.</td>
<td>0</td>
</tr>
<tr>
<td>B. Low to moderate population density (e.g., ≤1/4 to &lt; 1/2 native population density) with few other invasives present and/or documented in 1 or more non-adjacent state/province and/or 1 unconnected waterbody.</td>
<td>1</td>
</tr>
<tr>
<td>C. High or irruptive population density (e.g., ≥1/2 native population density) with numerous other invasives present and/or documented in 1 or more adjacent state/province and/or 1 connected waterbody.</td>
<td>2</td>
</tr>
<tr>
<td>U. Unknown</td>
<td>U</td>
</tr>
</tbody>
</table>

Documentation:
Describe population density:
Hard to know if populations are diploid or triploid.
Sources of information:

3.5. Number of habitats the species may invade

<table>
<thead>
<tr>
<th>Option</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Not known to invade any natural habitats given at A2.3.</td>
<td>0</td>
</tr>
<tr>
<td>B. Known to occur in 2 or 3 of the habitats given at A2.3, with at least 1 or 2 natural habitat(s).</td>
<td>2</td>
</tr>
<tr>
<td>C. Known to occur in 4 or more of the habitats given at A2.3, with at least 3 natural habitats.</td>
<td>3</td>
</tr>
<tr>
<td>U. Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
Rivers, lakes, and fish farm emboundments.
Sources of information:
NAS, 2013.

3.6. Role of anthropogenic (human related) and natural disturbance in establishment (e.g. water level management, man-made structures, high vehicle traffic, major storm
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events, etc).
A. Requires anthropogenic disturbances to establish. 0
B. May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances. 2
C. Can establish independent of any known natural or anthropogenic disturbances. 3
U. Unknown.

Documentation:
Identify type of disturbance:

Score 3

Sources of information:
NAS, 2013

3.7. Climate in native range (e.g., med. to high, ≥5, Climatch score; within 35 to 55 degree latitude; etc.)
A. Native range does not include climates similar to New York (e.g., <10%). 0
B. Native range possibly includes climates similar to portions of New York (e.g., 10-29%). 4
C. Native range includes climates similar to those in New York (e.g., ≥30%). 8
U. Unknown.

Documentation:
Describe known climate similarities:
Only one station = or > a score of 5.
Sources of information:
ADAFF, 2013.

Score 0

Total Possible 23
Section Three Total 8

4. DIFFICULTY OF CONTROL
4.1. Re-establishment potential, nearby propagule source, known vectors of re-introduction (e.g. biological supplies, pets, aquaria, aquaculture facilities, connecting waters/ corridors, mechanized transportation, live wells, etc.)
A. No known vectors/ propagule source for re-establishment following removal. 0
B. Possible re-establishment from 1 vector/ propagule source following removal and/or viable <24 hours. 1
C. Likely to re-establish from 2-3 vectors/ propagule sources following removal and/or viable 2-7 days. 2
D. Strong potential for re-establishment from 4 or more vectors/ propagule sources following removal and/or viable >7 days. 3
U. Unknown.

Documentation:
Identify source/ vectors:

Score 0

4.2. Status of monitoring and/ or management protocols for species
A. Standardized protocols appropriate to New York State are available. 0
B. Scientific protocols are available from other countries, regions or states. 1
C. No known protocols exist. 2
U. Unknown

Documentation:
Describe protocols:
Capture methods (Bonar et al., 1993), including methods for luring with sound (Willis, 2002) and more (FishPro, 2004).
Sources of information:
Bonar et al., 1993; FishPro, 2004; Willis, 2002.

4.3. Status of monitoring and/or management resources (e.g. tools, manpower, travel, traps, lures, ID keys, taxonomic specialists, etc.)
A. Established resources are available including commercial and/or research tools
B. Monitoring resources may be available (e.g. partnerships, NGOs, etc)
C. No known monitoring resources are available
U. Unknown

Documentation:
Describe resources:
Capture methods described (Bonar et al., 1993; Willis, 2002). Extensive management developed for Triploid grass carp, including commercial (SWDEC, 2013).
Sources of information:
Bonar et al., 1993; SWDEC, 2013; Willis, 2002.

4.4. Level of effort required
A. Management is not required. (e.g., species does not persist without repeated human mediated action.)
B. Management is relatively easy and inexpensive; invasive species can be maintained at low abundance causing little or no ecological harm. (e.g., 10 or fewer person-hours of manual effort can eradicate a local infestation in 1 year.)
C. Management requires a major short-term investment, and is logistically and politically challenging; eradication is difficult, but possible. (e.g., 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year for 2-5 years to suppress a local infestation.)
D. Management requires a major investment and is logistically and politically difficult; eradication may be impossible. (e.g., more than 100 person-hours/year of manual effort, or more than 10 person hours/year for more than 5 years to suppress a local infestation.)
U. Unknown

Documentation:
Identify types of control methods and time required:
Baiting, fishing, heating to aid in attraction, and hearing. Hearing was most efficient at 0.17-0.51 fish/man-hour.
Sources of information:

Total Possible 10
Section Four Total 4

C. STATUS OF GENETIC VARIANTS AND HYBRIDS:
At the present time there is no protocol or criteria for assessing the invasiveness of genetic variants independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol will likely require data on cultivar fertility and identification in both experimental and natural settings.

Genetic variants of the species known to exist: Triploid grass carp

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Hybrids of uncertain origin known to exist: Diploid and triploid Ctenopharyngodon idella×Hypophthalmichthys nobilis hybrids (Beck and Biggers, 1983).

References for species assessment:


Acknowledgments: The New York Fish and Aquatic Invertebrate Invasiveness Ranking Form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Invasive Species Council and Invasive Species Advisory Committee were incorporated in revisions of this form. Members of the Office of Invasive Species Coordination’s Four-tier Team, who coordinated the effort, included representatives of the New York State Department of Environmental Conservation* (Division of Fish, Wildlife and Marine Resources, Division of Lands and Forests, Division of Water); The Nature Conservancy; New York Natural Heritage Program; New York Sea Grant*; Lake Champlain Sea Grant*; New York State Department of Agriculture and Markets (Division of Plant Industry and Division of Animal Industry); Cornell University (Department of Natural Resources and Department of Entomology); New York State Nursery and Landscape Association; New York Farm Bureau; Brooklyn Botanic Garden; Pet Industry Joint Advisory Council*; Trout Unlimited*; United States Department of Agriculture Animal and Plant Health Inspection Service (Plant Protection and Quarantine and Wildlife Services); New York State Department of Transportation; State University of New York at Albany and Plattsburgh*; and Cary Institute of Ecosystem Studies. Those organizations listed with an asterisk comprised the Fish and Aquatic Invertebrate Working Group.

References for ranking form:


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FISH & AQUATIC INVERTEBRATE INVASIVENESS RANKING FORM


Natural Resources Board Order No. IS-34-06, Invasive Species Identification, Classification and Control. 2008. Wisconsin Department of Natural Resources, Madison Wisconsin.


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