

# Considerations regarding introduction of Grass Carp to Lake Chaffee

05-16-2012 - authored by Ralph Sherman – LCIA Environmental Chairman

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## ***Considerations regarding introduction of Grass Carp to Lake Chaffee***

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### **Objective of this document**

A contingent of concerned members of LCIA submitted a signed petition to the board on 05/09/2012. The petition basically states those who have signed would pay for buying Grass Carp to help with weed control for our lake. In an effort to assist the board and any interested readers this document was generated to provide consolidated information so an informed decision can be made. Many small/private pond owners have successfully utilized Grass Carp to help control weeds in their ponds. Some have failed by over stocking the pond and the Grass Carp stripped the pond of all vegetation killing the other desirable aquatic life, some have failed because the Grass Carp only eat certain plants. There have been both successes and failures in larger lake type environments documented as well.

The introduction of a non native species to any ecological environment must be given both short and long term impacts being reviewed.

### **What are Grass Carp (aka White Amur)**

(From online encyclopedia Wikipedia)

The **Grass Carp (*Ctenopharyngodon idella*)** is a herbivorous, freshwater fish species of family Cyprinidae, and the only species of the genus *Ctenopharyngodon*. It is cultivated in China for food, but was introduced in Europe and the United States for aquatic weed control.

It is a large native to eastern Asia, with range from northern Vietnam to the Amur River on the Siberia-China border.<sup>[1]</sup>

It is a fish of large, turbid rivers and associated floodplain lakes, with a wide degree of temperature tolerance. Grass Carp are usually thought to enter reproductive condition and spawn at temperatures of 20 to 30 °C (68 to 86 °F),<sup>[1]</sup> but have been shown to sometimes spawn at temperatures as low as 15 °C (59 °F).<sup>[2]</sup>

In the United States, the fish is also known as **white amur**, a name developed to avoid use of the name "Carp", which has derogatory connotations in North America. The name derives from the Amur River, where the species is probably native, but has never been abundant. This is not to be confused with the "white amur bream" (*Parabramis pekinensis*), which is not a particularly close relative as Cyprinidae.

Many states in the US (including Connecticut) control the introduction of the Grass Carp. Connecticut relies on DEEP to determine if the location is acceptable and only sterilized Grass Carp are allowed to be introduced (liberated) if the DEEP approves the location (see description below of process /requirements to obtain a permit) .

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### **What do they look like and how big are they?**

The Grass Carp are typically bought at 10 inches or larger to avoid becoming easy prey to largemouth Bass. They grow very rapidly, and young fish stocked in the spring will reach over 18 inches by fall. **Adults often attain near 3.9 ft in length and over 40 pounds in weight.**



Grass Carp have elongate, chubby, torpedo-shaped body forms. Their mouth is slightly oblique with non-fleshy, firm lips, and no barbels (whiskers).

The complete lateral line contains 40 to 42 scales. Broad, ridged, pharyngeal teeth (same as a goldfish recessed in the back of the mouth) are arranged in a 2, 4-4, 2 formula. The dorsal fin has 8 to 10 soft rays, and the anal fin is set closer to the tail than most cyprinids. Body color is dark olive, shading to brownish-yellow on the sides, with a white belly and large, slightly outlined scales.

### **How long do they live**

According to one study, they live an average of five to 9 years, with the oldest gaining 11 years. They eat up to three times their own body weight daily when young and lesser amounts as they age. They thrive in small lakes and backwaters that provide an abundant supply of freshwater vegetation.

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## **Why are they used for weed control?**

The species was introduced in the Netherlands in 1973 for overabundant aquatic weed control. The release in the US is regulated state by state.

Grass Carp can consume up to 300% of their body weight daily. They eat from the top of the plant first so there is a minimal turbidity impact. They are not predators so they do not eat anything but the plants they like.

When used for weed control, often the fish introduced to the pond or stream are sterile, called triploid fish. The process for producing triploid fish involves shocking eggs with a rapid change in temperature or pressure. This process is not usually 100% effective, therefore, in the United States; the young are usually tested for triploidy before being sold. Only allowing sterilized fish to be liberated insures the population can be controlled. If non sterilized fish are released into a lake or small pond it is likely there could be a risk of over population and a subsequent stripping of all vegetation is real.

## **How long will it take to see an effect on the lake?**

Per the 2009 study the lake is about 52 acres. The generally recommended level of weed coverage for a healthy lake is a minimum of 40%. The number of fish introduced should only be at the level to maintain desired coverage as such it can take a long time (2 or more years) before LCIA members could see a noticeable effect.

## **Can you fish for Grass Carp?**

Yes - Grass Carp grow large and are strong fighters on a rod and reel, but because of their vegetarian habits and their wariness, they can be difficult to catch. Chumming with corn adds to success. Canned corn, cherry tomatoes, and, despite their primarily vegetarian habits, Grass Carp sometimes eat other vegetarians. Chumming with white bread and using a piece of bread pinched on a hook floated on the surface works well too (especially for pond Grass Carp). Other bait often consists of vegetables or fruits that are native to the area.

The fish are wary quarry for bow-fishers where bow-fishing for Grass Carp is legal.

When searching for Grass Carp to fish, one may often spot fish cruising near the surface or very close to the shoreline. Often, an angler will spot a telltale swirl in the water near the shore without even glimpsing the fish. Grass Carp often feed or rest near the shoreline, and are very wary in such places. They usually will dart away at the first sight of a person walking nearby. Stalking the fish to place a piece of bait nearby is sometimes successful. Casting bait on top of the fish usually results in spooking the fish.

Grass Carp caught in ponds and lakes where they were stocked for weed control should be handled with care and released without harm

## **Can you eat the Grass Carp?**

Yes - They are considered to be on the bony side but are used as a food source in many places across the world. The fish may be steamed, pan-fried, broiled, or baked. They have actually been preferred in taste tests to more traditional game fish like catfish, bass and trout.

## **What do Grass Carp eat?**

Grass Carp while voracious eaters are somewhat selective eaters. The list below is not all inclusive but is representative to help the reader understand that not all weeds have the same appeal. Even for those items the Grass Carp will eat there is a preference order, so if an abundance of one weed or another is present the fish might opt to not eat (aka control) the more abundant source of weeds until those that “taste better” to the fish are depleted.

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### **Some Plants that Grass Carp are considered to control.**

1. Bladderwort Naiads
2. Chara Parrotfeather (Myriophyllum)
3. Coontail (Ceratophyllum)
4. Pondweeds (Potamogeton)
5. Fanwort Widgeongrass
6. Hydrilla Spike rush

### **Some plants that Grass Carp DO NOT control.**

1. Alder Rushes
2. Alligatorweed Sedges
3. American lotus Smartweed
4. Arrowhead Spatterdock
5. Button bush Southern watergrass
6. Cat tails Torpedograss
  - Duck weeds Waterhyacinth
7. \*\* Filamentous algae \* Watermeal
8. Fragrant waterlily Water pennywort
9. Frogbit Water primrose
10. Maidencane Watershield
11. Pickerelweed Willows
12. Planktonic algae White waterlily

**See the below for what weeds were found in Lake Chaffee in a 2009 study**

## **CT Requirements before liberation**

1. CT controls the introduction of Grass Carp
2. Only Triploid (sterilized) Grass Carp are allowed to be sold and liberated in CT

TGC Pkt 2012.PDF

← (Click to open the application and instructions)

3. First step is for LCIA would be to submit an application (attached above) to the CT DEEP, Inlands Fisheries Division.
4. The application precipitates an inspection by Mindy Barnett to see if Lake Chaffee is suitable to use Grass carp (The instructions state to expect a minimum of 30 days from submittal of application).
  - Notable items
    - All inlets and outlets must be properly gated to prevent escape of the Grass Carp (we do not have these currently). The specifications for the detainment gates are in the attached application form.
    - Because we have a Dam (spillway) a Dam inspection and permitting may be required before the screening can be in stalled
    - Must have Aquatic plants of the type Grass Carp are used to control (we qualify) – see below
5. Until CT authorizes use we cannot procure nor liberate any Grass Carp

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## Costs to consider

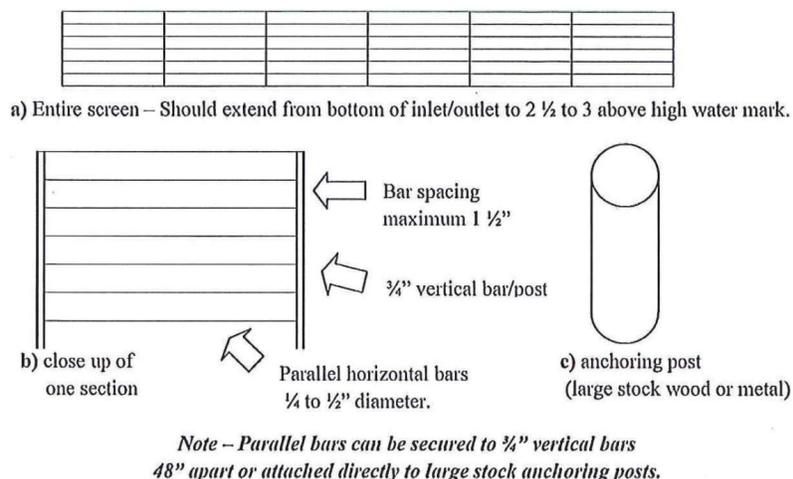
### Start up

- Permitting – no apparent cost
- Purchase of fish – About \$3,000 (estimate only) #162 fish [3 per acre 54 acres] (\$18 each for 10" or bigger triploid fish)
- Installing detainment screening (\$2,500 actual cost \$ unknown)
  - Outlet – this cost could be determined now if desired since we only have the spillway as an outlet.
    - The process requires DEEP Dam Safety division to approve the use of the screening on the Dam (we are a class B Dam). Such an inspection could precipitate other actions to be demanded by the DEEP.
    - LCIA should have the spillway detainment screening professionally designed, built and installed to the states specification. Suggest until real numbers are acquired we use \$2,500 as a budgetary figure.
  - Inlets – It is not clear yet what the requirement of the state will be. The verbiage used states all inlets must be gated, however since we are not connected to any upstream bodies of water our inlets are only runoff. Runoff streams would not be suitable to sustain Grass Carp life up stream so we may not need to install detainment barriers. If the state determines we must screen all inlets this could become quite costly.

### Ongoing costs

- Maintenance of the containment barriers each spring these screens will need to be inspected and repaired if damage has occurred.
- Restocking of fish – It is recommended a restocking of the Grass Carp occurs every 5-7 years. LCIA should plan for about 20% annually as a budget item to maintain a stock of these fish. If initial estimates are low then additional costs will be incurred to attain a desired level of control of the weeds (the usual recommend is to start with low estimated numbers, as it is less harmful than too many fish could be.

Figure 1. General layout for parallel bar style emigration control screen.



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### **Other factors to consider**

#### **PRO's**

- They are extremely environmentally friendly unlike chemical controls.
- They have been safely used across the planet to help control certain weeds for decades.
- They are not a predator threat to the existing fish population (they only eat the plants).
- They eat from the top of the plant so they will not disturb the silt layer and therefore make the water muddy.
- They can be fished for and eaten.

#### **CON's / Risks**

- Once you introduce the Grass Carp it is extremely difficult to remove them from the lake.
- The start up and ongoing cost is not insignificant
  - Start up (estimates only) near \$5,500 (includes fish and detainment screening assuming only the spillway must be covered)
  - Ongoing (@\$1,300 annual line item on budget).
    - Assume natural attrition of 20% replacement fish needed annually which equates to @\$1,000 per year. Factor - They are easy prey since they live near the surface of the water making them a favored food for several predators including Otter, Muskrat, Eagle <- depending on attrition annual cost could grow higher.
    - Assume @\$300 annually for maintenance of the detainment unit(s). It is unclear who will clean and or repair said screens as is needed. Clogged screening at the Dam could create a very hazardous scenario if the lake rises above normal levels.
- The Grass Carp may not clean weeds from some desired areas. They avoid locations heavily used by humans (main and mothers beach as examples).
- The Grass Carp prefer certain weeds over others, the effect of changing the balance of the weed population will be unknown. We could end up with a lot more weeds that we like less than the ones we have today.
- The Grass Carp can grow quite large (up to 4 feet long and up to 40 pounds in weight) – which may be mentally troubling to some swimmers / residents.
- If too many Grass Carp are added to the lake they can remove all the vegetation which would render other fish and fowl without food sources.
- As a part of the application and the subsequent introduction of these controlled fish we must agree to inspections by the state (DEEP) of the Dam which could precipitate demands from DEEP regarding the Dam and or the surrounding area.
- As part of introducing the Grass Carp we also agree to allow DEEP to perform inspections of the lake, the fish in it, and the detainment screens forever.

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### **Options / Recommendations to the board**

The apparent risk for introducing these fish is balanced well by the potential benefits. The longevity of the fish is only 5-9 years. Because they are sterile they cannot over run the lake. Their most productive years are 1-4 during which we should be able to evaluate if this is a good program. If we decide they are undesirable we simply do not replenish the stock and they will eventually die off.

**Option 1** - The board agrees to pursue the Grass Carp option farther the recommended next steps are as follows:

1. Vote to allow Ralph Sherman to submit the application to the DEEP to initiate the evaluation to see if Lake Chaffee is a candidate.
  - a. Note - This will precipitate a Dam Safety inspection.
  - b. Ralph is willing work with the DEEP to complete the inspection process.

**If the lake is not considered a candidate then the item is closed.**

2. If the Lake is a candidate next steps -
  3. Ralph will use the states requirements to assemble cost estimates for the start up (detainment screening installations, fish procurement) and revise ongoing costs.
  4. The board can then present the findings to the general population at the July or August meeting if done in time. At the presentation meeting we would be requesting a vote to determine LCIA action on the topic. Approval would mean building into the budget expenditures to both execute start up and insure ongoing expenses are covered annually.

**Option 2** – at a special meeting of the LCIA membership review the information and ask the membership to vote on continued action or not.

**Option 3** – Decide to not pursue the matter any further dismissing this as an approach.

**As environmental Chairperson I recommend option 2 because of the following considerations:**

- a) This is a long term commitment - 5-10 years longevity of the Grass Carp
- b) Costs to the Association are not insignificant both start up and ongoing. The membership should be involved in adding anything to the annual budget for previously unbudgeted line items.
- c) The visual and use impacts of having the needed number of 40 lb fish in the lake concerns me more than the visual impact the weeds have had in the last 2 years.
- d) Potential demands of DEEP Dam Safety inspection which could precipitate significant additional costs.

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### **Weeds found in Lake Chaffee (2009 study)**

#### **Potamogeton perfoliatus (eaten by Grass Carp)**

**Common names:** claspingleaf pondweed, perfoliate pondweed, redhead grass

*Potamogeton perfoliatus* is a submerged aquatic plant that occurs in still and flowing freshwaters in temperate climates. It is known as clasped pondweed as the leaf bases perfoliate (are wrapped around the stem). This is one of the commonest pondweeds. All the leaves are under water; there are no floating leaves as in some other common *Potamogeton* species. It is common in lakes, ditches and slow rivers and streams, and is tolerant of quite a wide range of nutrient status.

#### **Description**

*Potamogeton perfoliatus* is one of the common pondweeds, rather robust, with the leaf bases wrapped around the stem. All the leaves grow under water and there are no floating leaves. Leaves are flat, oval-shaped, 2-6cm long, narrow (due to lack of light and calcium) but margins are slightly crisped (Farmer, 2003; MDNR, 2005). Plants have thicker, darker green foliage than do plants growing in deeper water (MDNR, 2005). Ailstock and Shafer (2004) state "reedgrass typically survives in winter by persistence of sparsely branched pale rhizomes embedded in the sediments. Inflorescences are variable but mostly consisting of 5-12 flowers with each consisting of 4 Carpels which in turn contain a single ovule. Seed formation ranges from 20-48 seeds per inflorescence". Redhead grass has an extensive root and rhizome system that securely anchors the plant (MDNR, 2005).



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### **Vallisneria Americana (eaten by Grass Carp)**

#### **Wild Celery (*Vallisneria americana*)**

**Common names:** Water celery, eelgrass, tapegrass.

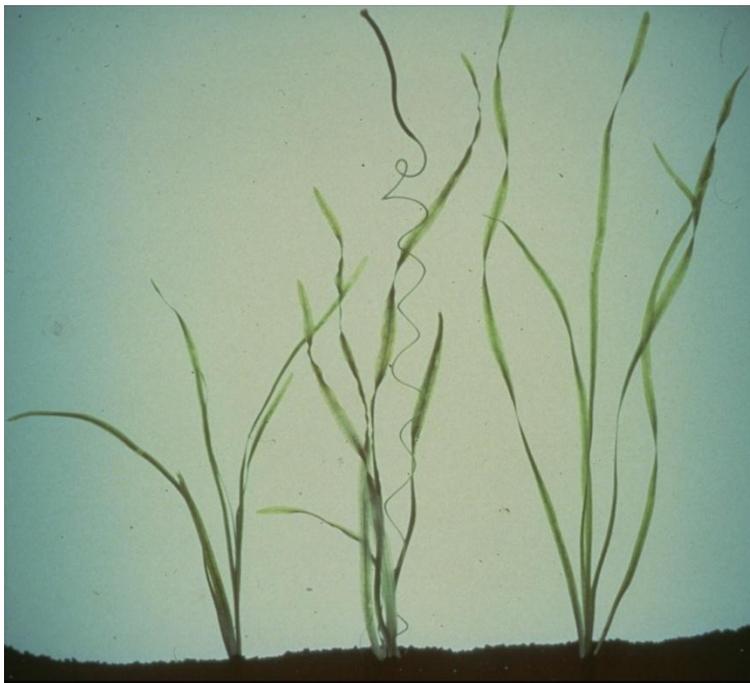
**Location:** Lakes in depths up to 15 feet and streams; prefers semi-hard bottom such as sand covered with a thin layer of muck.

**Description:** Leaves are ribbon-like, dark-green, and grow below the water surface; rooted in mud; in late summer, produces a small, whitish-yellow flower, supported by a coiled stalk; often grows in beds amid pondweeds and other submerged plants.

**Hints to identify:** Unbranched leaves extending from the lake bottom to the water surface; flowers (and occasionally some leaves) float on the surface; leaves are attached to a horizontal central stem right above lake bottom.

**Importance of plant:** Provides shade and shelter for bluegills, young perch, and largemouth bass; choice food of waterfowl, particularly diving ducks; attracts muskrats, marsh birds, and shore birds.

**Management strategy:** Because wild celery is an excellent wildlife food, it is usually best left alone. Abundant growth during July and August in shallow water may interfere with recreation. Herbicides don't work well to control this plant. Hand-pulling or raking sometimes works, though floating, uprooted plants often re-establish themselves in shallow water.



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### **Elodea nuttallii (Water weed Nuttall) (eaten by Grass Carp)**

[http://www.ceh.ac.uk/sci\\_programmes/documents/NuttallsPondweed.pdf](http://www.ceh.ac.uk/sci_programmes/documents/NuttallsPondweed.pdf)

*Elodea nuttallii* is a species of [waterweed](#) known by the common name **western waterweed**. This is a perennial [aquatic plant](#) which is native to North America where it grows submersed in lakes, rivers, and other shallow water bodies. It is also found in Eurasia, where it is commonly [weedy](#); it is not known as a weed species in its native range. It is sometimes used as an [aquarium](#) plant.



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### **Najas flexilis (naiad family likely eaten by Grass Carp)**

*Najas flexilis* is an [aquatic annual plant](#) native to parts of North America and Europe. Its common names include **slender naiad** and **nodding waternymph**.

The plant inhabits shallow bodies of brackish and fresh water such as lakes and bays. In North America, it is found along the Pacific coast, in the north and northeast portions of the continent, and in disjunct populations in Missouri and Utah.<sup>[1]</sup> It is also native to northern Europe, where its range includes Scotland,<sup>[2]</sup> Poland<sup>[3]</sup> and Sweden.<sup>[4]</sup> It is rare in the European portion of its range and is strictly protected by Appendix I of the [Berne Convention](#).



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### **Potamogeton bicupulatus (unlikely if eaten by Grass Carp)**

Common name: Waterthread pondweed

#### Description:

A small, delicate aquatic plant, *P. bicupulatus* closely resembles another rare species of pondweed. Fruits, though very small, appear to the naked eye to have a noticeably bumpy surface. This is due to their 3 rows of sculpted ridges around the rim of a tiny, disk-shaped seed: 1 ridge on the rim and 2 smaller ridges, 1 on each side of the rim. These ridges are also found in *P. diversifolius*, but distinct from most other narrow-leaved pondweeds that have a single ridge or no ridge. *Potamogeton bicupulatus* also has extremely fine, hair-thin leaves, less than 0.3 mm (0.01 in.) wide, along typical segments of the underwater stem. If present, the floating leaves are small and oval, at most about 1 cm (0.4 in.) wide and 2 cm (0.8 in.) long. Floating leaves are variable in size and not definitive in distinguishing this species from other.



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### Callitriche sp. (possibly eaten by Grass Carp)

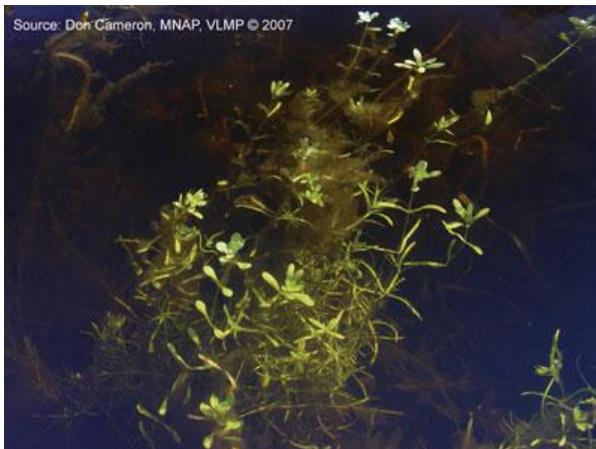
*Callitriche palustris* L. - vernal water-starwort

*Callitriche palustris* and *Callitriche heterophylla*

**Habitat:** Common water starwort (*Callitriche palustris*) and large water starwort (*Callitriche heterophylla*). Both are found in the [submersed](#) and [floating](#) leaf plant communities. Water starworts are generally found in quiet, cool (often spring-fed) waters or along muddy shores, preferring muddy or sandy [substrates](#).

**Description:** The two water starwort species share many common characteristics. Both water starworts have fine stems that are 10 to 20 cm long. The [submersed](#) leaves are [opposite](#), and arranged in pairs or in groups of three. The delicate leaves are simple, entire and variable in appearance. The [submersed](#) leaves tend to be pale green and linear. The upper leaves are more rounded (5mm wide) and crowded at the tip, forming a [rosette](#) that floats on the surface. The flowers grow in the [axils](#) of the leaves and produce very small capsule-like [fruits](#) (1 to 1.4 mm).

The [fruits](#) provide the best means of distinguishing between the two species. The [fruits](#) of common water starwort are 2mm longer than they are wide, winged, with a shallow groove between the wings, and surface pits arranged in vertical rows. The fruits of large water starwort are nearly as wide as they are long (no more than 1 mm longer than wide), sometimes with shallow grooves, but no wings. The surface has pit-like markings, but they are not in rows.



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### **Utricularia radiata (possibly eaten by Grass Carp)**

***Utricularia radiata*, the little floating bladderwort**

*Utricularia radiata*--This is one of the many species in this section that have cool floats on the inflorescences. It is smaller than *U. inflata*, but this is not a reliable character to use in separating the species. A character that is reliable is the difference in float arm shape (it is cylindrical in *U. radiata*, while they taper at both ends for *U. inflata*). The leaf branching is also significantly different. At each node, two leaf branches emerge, and how each branch further divides is important--in *U. radiata* this is largely dichotomous, with the secondary leaf segments shorter than the primary leaf segments. The leaves of *U. inflata* are more or less pinnate, and the secondary leaf segment is longer than at least one of the primary leaf segments.



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### **Sparganium (not likely eaten by Grass Carp)**

Sparganium, commonly known as the bur-reed, is a genus of aquatic plants of shallow marshes, ponds and streams. There are 9 species found in the United States and Canada <sup>[1]</sup>. It is characterized by a stem, which may be floating or emergent, bearing strap-like leaves, and spherical heads bearing either male or female flowers. <sup>[2]</sup>

Sparganium is an important component of aquatic and wetland vegetation in temperate to arctic regions. It provides food and cover for wildlife and waterfowl. It has been determined from phylogenetic analysis to be the closest living relative of the genus [Typha](#) (cat-tail).

The genus name Sparganium was published by [Linnaeus](#) in Species Plantarum (1753), with two species recognized: *S. erectum*, and *S. natans*.

Perhaps the first mention of Sparganium in the English language was made by [William Turner](#) (1562)<sup>[3]</sup>. Turner noted that there was no name for the plants in English, and suggested bedesedge or knop sedge. Further, he noted, "the virtues of Sparganium: The roote is good to be geven wyth wyne agaynste the poyson of serpentes."



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### **Reference web sites**

<http://fullserviceaquatics.com/aquatic-plants/grass-Carp-for-your-pond/>

<http://www.aquaticmanagement.com/grassCarp.html>

<http://www.ecy.wa.gov/programs/wq/plants/management/aqua024.html>

<http://forums.pondboss.com/ubbthreads.php?ubb=showflat&Number=34100>

<http://www.govengr.com/ArticlesJul05/Carp.pdf>

[http://www.waterboards.ca.gov/water\\_issues/programs/npdes/docs/sfei\\_reports/pestalt\\_review.pdf](http://www.waterboards.ca.gov/water_issues/programs/npdes/docs/sfei_reports/pestalt_review.pdf)

<http://hickslake.org/Files/GrassCarp.pdf>

[http://www.gri.msstate.edu/publications/docs/2009/01/59422009\\_Dibble\\_and\\_Kovalenko.pdf](http://www.gri.msstate.edu/publications/docs/2009/01/59422009_Dibble_and_Kovalenko.pdf)

<https://srac.tamu.edu/index.cfm/event/getFactSheet/whichfactsheet/160/>

<http://cloa.org/Documents/TGC%20Packet%201st%20SEC%202010.pdf>

<http://www.ct.gov/dep/cwp/view.asp?a=2696&q=322716>