Effects of Carp on the Survival and Growth of Wild Rice

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Upper Clam Lake (Burnett County, WI)
Wild Rice in Upper Clam Lake

290 acres of dense rice
Wild Rice in Upper Clam Lake

210 acres of sparse rice
Wild Rice in Upper Clam Lake

84 acres of "rice"
Decline of Wild Rice in Upper Clam Lake

Wild Rice Harvested: 1992-2009

Data Provided by Peter David (Great Lakes Indian Fish and Wildlife Commission)
What Happened?

- Weather/Climate
- Disease
- Water Quality
- Water Level
- Sediment Nutrients
- Herbicides
- Carp
Carp in Upper Clam Lake: 2009

- Age 4: 42%
- Age 13: 5%
- Age 16: 9%
- Age 17: 4%
- Age 18: 5%
- Age 19: 9%
- Age 20: 4%
- Age 22: 3%
- Other Ages: 13%
Timing: Rice Decline and Carp

Data Provided by Peter David (Great Lakes Indian Fish and Wildlife Commission)
Evidence for carp affecting wild rice?

“Carp biomass <30 kg/ha had no discernible effects on vegetative cover... extremely damaging to the ecological integrity of shallow lakes when its density exceeds 100 kg/ha” - Bajer et al. 2009

“Carp have a negative effect upon aquatic vegetation... It is generally agreed that carp destroy aquatic vegetation by uprooting plants. Others also suggest that carp eat submerged macrophytes.” - Crivelli 1983
Key questions for restoring wild rice in Upper Clam Lake:

1. Are there many wild rice seeds remaining in the lake’s sediments?

2. Are direct carp effects (uprooting or grazing) responsible for the decline of wild rice in the lake?

3. Would rice recover on a large scale if carp population was reduced?
Question 1
Are there rice seeds in the lake sediments?
What is typical rice seed abundance?
Question 2

Are direct carp effects responsible for the decline of wild rice in the lake?
2010 Plot Study

Fenced Plots
- Seeded
- Not Seeded

Open Plots
- Seeded
- Not Seeded
Study Plot Assessment
Study Plot Assessment

Wild Rice Stem Counts: May 2010

- Fence + Seed
- Fence
- Open + Seed
- Open

Wild Rice Stems / m²

- Site A
- Site B
- Site C
May 2010

Fence / Seed | Open / Seed | Fence | Open
---|---|---|---
A | | | |
B | | | |
C | | | |
Study Plot Assessment

Wild Rice Stem Counts: July 2010

Wild Rice Stems / m²

Site A
Site B
Site C

Fence + Seed
Fence
Open + Seed
Open
What about other plants?
Question 3

Would rice recover on a large scale if carp population was reduced?
Carp Barriers
Carp Barriers

Stems/m²

2010  5 ±4
Carp Barriers

Stems/m²

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<th>Value</th>
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<td>5 ±4</td>
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<td>1 ±1</td>
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Carp Barriers

<table>
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<th>Year</th>
<th>Stems/m²</th>
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<td>2010</td>
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<tr>
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<tr>
<td>2012</td>
<td>53 ±10</td>
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Key questions for restoring wild rice in Upper Clam Lake:

1. Are there many wild rice seeds remaining in the lake’s sediments? **NO**

2. Are direct carp effects (uprooting or grazing) responsible for the decline of wild rice in the lake? **YES**

3. Would rice recover on a large scale if carp population was reduced? **YES**
Assessment of Carp Population

80,000 Carp
Mean weight ~ 4 kg
Density ~ 400 kg/ha
Carp Removal: 2011-2012

Removed 23,000 Carp
~ 80,000 kg
~30% of population
Density ~ 300 kg/ha
Summary poster and full report available for download at...

fixmylake.com