



# **Wild Rice (Manoomin) Abundance and Harvest in Northern Wisconsin in 2008**

by  
Peter F. David  
Wildlife Biologist

Administrative Report 10-02  
March 2010

**Great Lakes Indian Fish  
& Wildlife Commission**  
Biological Services Division  
P.O. Box 9  
Odanah, WI 54861  
(715) 682-6619



Acknowledgments: I would like to thank Dara Olson, Micah Cain and John Patrick for their assistance in entering and analyzing the data summarized in this report, and Neil Kmiecik for his editorial review. *Miigwech!*

## **MANOOMIN (WILD RICE) ABUNDANCE AND HARVEST IN NORTHERN WISCONSIN IN 2008**

### **INTRODUCTION**

As part of its wild rice management program, the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) conducts annual surveys of wild rice abundance on northern Wisconsin waters. These surveys provide a long term data base on wild rice abundance and annual variability in the ceded territory.

GLIFWC also conducts an annual survey to estimate the amount of wild rice harvested off-reservation in the Wisconsin ceded territory. The Wisconsin Department of Natural Resources (WDNR) cooperates with this survey by providing the names and addresses of state wild rice harvest license purchasers, so that both state and tribal harvest can be estimated. The 2008 survey was similar in design to a survey first conducted in 1987, and repeated each year since 1989, with minor modifications as described in the Methods section.

### **METHODS**

#### **Abundance Estimation**

A select group of 30 lakes and 10 river or flowage sites have been ground surveyed most years since 1985; abundance information from these waters is used to derive a yearly index of rice abundance in the ceded territory. The index is derived by multiplying the number of acres of rice on each water surveyed by a factor ranging from 1 to 5 which relates to rice density (1=sparse, 5=dense) and then summing the values derived for each of the 40 waters. In addition to abundance information, ground surveys include information on habitat suitability (e.g. abundance of competing vegetation, presence of beaver, obvious development impacts). Ground surveys were conducted from mid-July through late August.

Aerial surveys of some of these waters, and additional waters not ground surveyed, were conducted on six days between July 22<sup>nd</sup> and August 15<sup>th</sup>. Aerial survey information is limited to an estimate of the size and approximate density of the rice beds. These surveys provide abundance information from waters not ground surveyed, help verify ground estimates of manoomin acreage, occasionally fill in survey gaps when ground crews are unable to access lakes, and help the Commission direct ricers to the more productive stands.

One water, Rice Lake in Polk County, with an average abundance index of 168 (1985-2006) was not surveyed in 2007. Thus, when comparisons were made between 2008 and 2007, data for this lake were suppressed for 2008 as in 2007. For comparisons between 2008 and long term averages, an index for 2007 was estimated for this water by applying the ratio between the 2007 overall index for all other waters and the long term overall index for all other waters (3,272/5,044) to the long term index for Rice Lake (168). This produced an estimated index of 110 for this water in 2007.

## Harvest Estimation

Slightly different techniques were used to estimate harvest by tribal and state ricers. Tribal members who wished to harvest rice off-reservation were required to obtain an off-reservation harvesting permit validated for ricing. This permit was obtained by 1306 individuals in 2008. When individuals obtained their 2008 permit, they were asked if they harvested rice the previous year. Thirty-three percent (79/237) of the individuals who indicated they had riced in 2007 (“active” ricers) were surveyed by phone, as well as 20% (206/1027) of those individuals who indicated they had not riced the previous year (“inactive” ricers). Since 42 permit holders failed to answer the question, these individuals were treated as a third group in this survey (as has been done in most years since 2001); 14% (6/42) of these individuals were also surveyed (“non-responsive” ricers) (Table 1).

The number of tribal members who actually harvested off-reservation in 2008 was estimated by extrapolating the percent of active respondents in each group (Table 1). Due to differences in sampling and activity rates among groups, separate harvest estimates were made for each group, then combined to estimate total tribal harvest.

GROUP	TOTAL NUMBER	# SURVEYED	% SAMPLED	% ACTIVE OFF-RESERVATION	EST. # ACTIVE OFF-RESERVATION
ACTIVE <sup>1</sup>	237	79	33%	46.8%	111
INACTIVE <sup>1</sup>	1027	206	20%	3.4%	35
NON-REPOSIVE <sup>1</sup>	42	6	14%	16.7%	7
TOTAL	1306	291			153

<sup>1</sup> Based on activity the previous year; see discussion in text.

State ricers were required to obtain a state license. A mail questionnaire was mailed to 624 of the 651 individuals who obtained a state license. All harvest estimates were made by expanding the results reported by the 353 respondents to the state survey (54% of licensees).

## RESULTS AND DISCUSSION

### Abundance Estimation

Ground survey results and abundance information for the 40 waters surveyed annually are reported in Figures 1 and 2, and Table 2. In addition, abundance estimates for 53 additional waters surveyed only from the air are listed in Table 3. A total of 2,370 acres of wild rice was estimated for these 93 surveyed waters. Andryk (1986) estimated that the Wisconsin ceded territories supported approximately 5,000 acres of rice in 1985, a year with an abundance index considerably higher than in 2008.

Survey results and field observations indicate that rice abundance in 2008 was quite poor, particularly in the northwest part of the state. Overall, the abundance index decreased 11% from 2007, a relatively poor year itself (Table 2, Figure 1). However, this decline was very unevenly distributed; the index for northwest waters fell 25%, while the index for north-central waters showed little change. In the northwest, the abundance index increased on 9 waters, fell on 11, and was essentially unchanged on 1, but declines were much larger than increases. Burnett County beds in particular were poor, including Clam Lake, which had its second crop failure in a row. Among north-central waters, 7 rose, 4 fell and 7 were unchanged (Table 2, Figure 2). Vilas County held 3 of the 4 waters exhibiting a decline. Overall, the 2008 index was just 58 % of the long-term index average (1985-2008), and the lowest since 2000; 2008 was also one of the few years when the index for the northwest part of the state was lower than the index for the north-central area.

It remains difficult to determine why rice changes in abundance on either the regional or local scale because the environmental factors that influence abundance are not well understood. Wild rice is affected by a variety of factors, and the relative impact of each varies by year. Some of these factors, such as spring temperatures and water levels, can affect rice regionally, and may account for instances where beds in the north-central counties display one trend in abundance while those in the northwestern region may show another. At the other extreme, a localized impact can cause a stand to fail while those around it flourish. Furthermore, those factors that might explain some of the variation in rice abundance are not being monitored systematically. Thus, explanations about changes in rice abundance remain largely a matter of conjecture. However, the drought which many areas experienced in 2007 continued, especially in the northwest, in 2008. Rice also appeared to mature later than average in 2008, likely as a result of cool spring conditions. These cool conditions could have also resulted in some seed remaining dormant for the 2008 growing season.

Annual variability in rice abundance may be inversely related to the amount of water flow through the system. Relatively open systems such as rivers and flowages appear to vary less in rice abundance than relatively closed lake systems. Although open systems may still experience boom and bust years, the level of abundance tends to be closer to the average level most years. This may be because some environmental variables, such as nutrient availability or spring water temperatures, are more consistent in these systems from year to year.

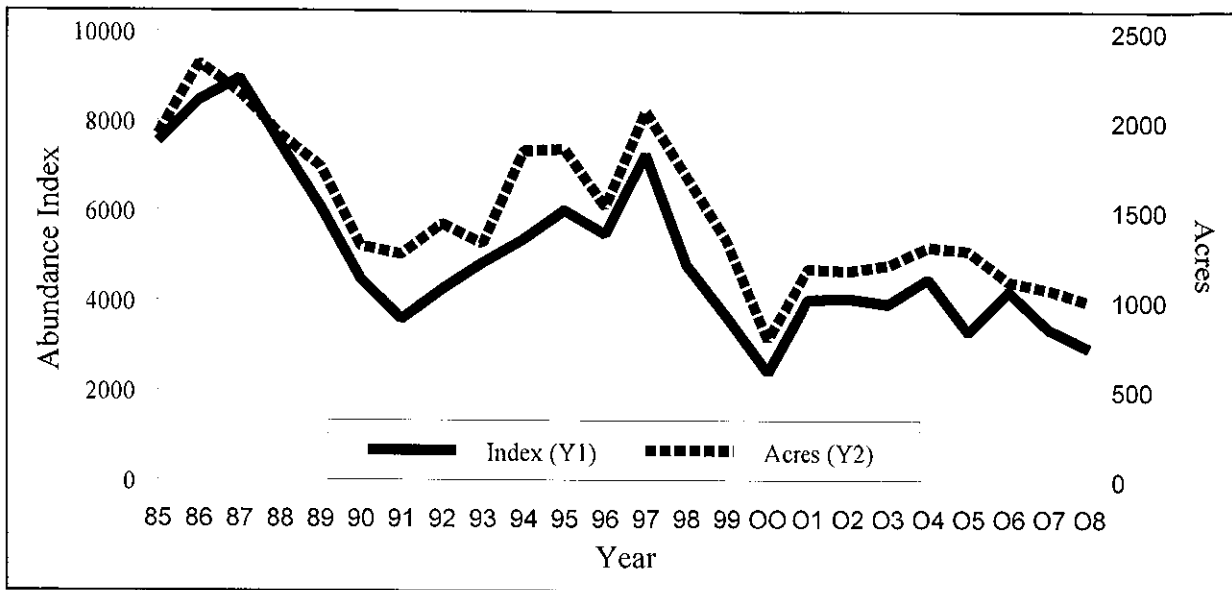


Figure 1. Manoomin acreage and abundance index from 40 Wisconsin rice waters surveyed annually from 1985-2008.

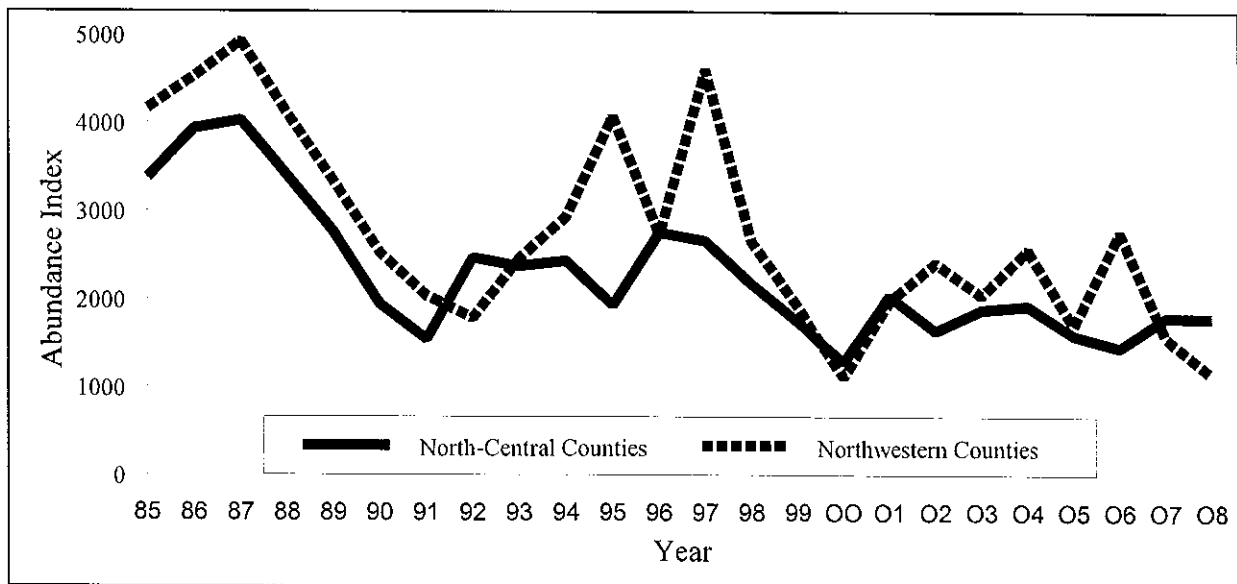


Figure 2. Manoomin abundance index from 40 Wisconsin rice waters surveyed annually from 1985-2008; northwestern versus north-central Wisconsin waters (Highway 13 used to separate northwestern from north-central waters).

Table 2. Manoomin acreage, density and abundance index from 40 Wisconsin waters for 2004-2007, and the 1985-2008 means. A density value of 1 = sparse; 5 = dense. (Data for 1985-2004 can be found in David, 2001; David, 2008 and David 2009.)

WATER	2005			2006			2007			2008			1985-2008		
	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX
<b>NORTHWESTERN CTYS.</b>															
<b>BARRON</b>															
SWEENEY CREEK	11	2	22	0	0	0	1	4	4	1	1	1	9	2.5	32
<b>BAYFIELD</b>															
TOTOGATIC LAKE	350	2	700	108	2	216	215	1	215	54	1	54	156	2.5	454
<b>BURNETT</b>															
BASHAW LAKE	4	2	8	1	1	1	0	0	0	21	1	21	10	2.3	27
BIG CLAM LAKE	120	2	240	220	4	880	15	2	30	10	2	20	142	3.3	488
BRIGGS LAKE	22	3	66	30	4	120	33	4	132	25	4	100	28	3.8	110
GASLYN LAKE	5	1	5	1	1	1	28	4	112	6	2	12	23	3.1	80
LONG LAKE	20	2	40	65	4	260	65	4	260	64	3	192	69	2.6	184
MUD LAKE (2)	10	1	10	13	5	65	15	3	45	4	4	16	13	3.6	48
WEBB CREEK	12	3	36	20	5	100	15	5	75	11	5	55	12	4.0	57
<b>DOUGLAS</b>															
MULLIGAN LAKE	42	3	126	9	2	18	23	3	69	4	2	8	24	2.2	58
<b>POLK</b>															
RICE BED CREEK	10	2	20	15	4	60	15	5	75	19	5	95	11	4.3	51
RICE LAKE (1)	30	4	120	4	2	8			110*	15	3	45	46	3.3	162
WHITE ASH LAKE	7	4	28	7	2	14	5	3	15	10	3	30	12	3.2	38
<b>SAWYER</b>															
BILLY BOY FLOW.	7	2	14	7	5	35	7	2	14	16	3	48	13	2.3	42
BLAISDELL LAKE	90	1	90	65	4	260	90	1	90	50	3	150	77	2.8	212
PACWAWONG LAKE	24	2	48	90	4	360	40	3	120	35	2	70	85	3.6	328
PHIPPS FLOWAGE	15	1	15	26	5	130	5	3	15	23	4	92	29	3.9	114
<b>WASHBURN</b>															
DILLY LAKE	8	4	32	11	3	33	11	5	55	2	2	4	19	4.0	80
POTATO LAKE	8	2	16	1	1	1	4	3	12	13	3	39	13	3.0	41
RICE LAKE	8	3	24	9	3	27	7	3	21	9	3	27	20	3.3	75
SPRING LAKE (1)	17	2	34	43	4	172	32	3	96	18	2	36	17	2.8	55
TRANUS LAKE	4	3	12	3	2	6	14	1	14	18	2	36	31	1.6	50
SUBTOTAL	824		1706	748		2767	640		1579	428		1151	849		2789
<b>NORTH-CENTRAL CTYS.</b>															
<b>FOREST</b>															
ATKINS LAKE	0	0	0	0	0	0	0	0	0	0	0	0	16	0.6	46
INDIAN/RILEY LAKE	3	2	6	3	4	12	1	1	1	2	1	2	5	2.9	15
PAT SHAY LAKE	2	1	2	1	1	1	2	2	4	6	1	6	34	1.5	57
RAT RIVER	22	5	110	22	5	110	15	5	75	13	3	39	21	4.6	100
WABIKON LAKE	55	3	165	70	3	210	40	4	160	70	4	280	46	2.8	132
<b>LINCOLN</b>															
ALICE LAKE	55	2	110	6	3	18	10	1	10	20	3	60	46	3.0	159
<b>ONEIDA</b>															
FISH LAKE	4	2	8	2	2	4	7	2	14	5	2	10	29	3.1	104
LITTLE RICE LAKE	0	0	0	0	0	0	0	0	0	0	0	0	6	1.2	26
RICE LAKE	16	1	16	3	1	3	3	1	3	35	1	35	60	1.3	105
SPUR LAKE	18	2	36	8	2	16	3	3	9	70	1	70	65	3.0	237
WISCONSIN RIVER	140	5	700	150	5	750	140	5	700	150	4	600	144	4.6	657
<b>PRICE</b>															
BLOCKHOUSE LAKE	1	1	1	1	1	1	0	0	0	0	0	0	15	2.4	53
<b>VILAS</b>															
ALLEQUASH LAKE	20	3	60	8	2	16	65	3	195	80	4	320	64	3.9	266
LITTLE RICE LAKE	36	3	108	23	3	69	54	5	270	45	3	135	18	2.7	59
MANITOWISH RIVER	12	5	60	13	5	65	14	5	70	14	5	70	15	4.5	70
PARTRIDGE LAKE	16	3	48	23	3	69	24	5	120	22	4	88	19	4.2	84
RICE LAKE	43	3	129	28	4	112	40	4	160	30	2	60	27	3.5	94
WEST PLUM LAKE	14	3	42	2	2	4	6	2	12	5	4	20	19	3.1	65
SUBTOTAL	457		1601	363		1460	424		1803	567		1795	642		2328
COUNT:			40			40			39			40			440
TOTAL:	1281		3307	1111		4227	1064		3382	995		2946	1606		5117
AVERAGE:			83			106			84			74			128

\*water not surveyed; index value estimated.

Table 3. Estimated manoomin acreage and density for waters aerially surveyed in 2008.					
COUNTY	WATER	2008 EST. ACRES	2008 EST. DENSITY	2007 EST. ACRES	2007 EST. DENSITY
Barron	Bear Lake	24	sparse-med/dense	5	sparse-medium
Bayfield	Chippewa Lake	38	sparse-medium	48	sparse-dense
Burnett	Black Brook Flowage	6	medium-dense	not surveyed	medium-dense medium-dense medium-dense medium-dense medium-dense medium-dense medium-dense medium medium-dense
	Clam River Flowage	30	medium-dense	24	
	Grettum Flowage	140	medium-dense	32	
	Loon Lake (Carters Bridge)	33	dense	70	
	Lower Hay Creek Flowage	4	sparse-medium	not surveyed	
	Mud Lake (Oakland Township)	12	sparse	not surveyed	
	North Fork Flowage	40	sparse-medium	60	
	North Lang Lake	3	dense	3	
	Phantom Flowage	75	medium	8	
Rice Lake <sup>1</sup>	20	medium	10		
Douglas	Lower Ox Lake	4	sparse-medium	14	medium-dense
	Minong Flowage (Smiths Bridge)	20	medium	30	dense
	Radigan Flowage	30	medium-dense	10	dense
	St. Croix (Gordon) Flowage	15	medium-dense	10	medium
	St. Croix River/Cutaway Dam	42	medium	40	sparse-medium
	Upper Ox Lake	6	dense	6	medium-dense
Forest	Hiles Millpond	7	medium	4	medium
	Little Rice Flowage	200	sparse-dense	85	medium
	Scott Lake	8	medium	16	dense
Iron	Little Turtle Flowage	4	sparse	20	dense
	Mud Lake	5	sparse-medium	20	medium
Langlade	Daily Pond	10	sparse-dense	4	medium
	Miniwaukan Lake	8	medium-dense	5	dense
	Pickrel Creek (Goose Island)	15	medium-dense	3	medium
	Spider Creek Flowage	6	medium	5	medium
Oneida	Big Lake	10	medium	10	medium
	Cuenin Lake	11	medium-dense	27	dense
	Fourmile Lake	16	sparse-dense	7	dense
	Roe Lake	8	medium	6	medium
	The Thoroughfare	25	sparse-dense	65	medium-dense
	Wolf River <sup>2</sup>	20	dense	20	dense
Polk	Somers Lake	11	dense	not surveyed	
Price	Lower Steves Creek Flowage	10	dense	not surveyed	
	Spring Creek WA Flowages	130	dense	not surveyed	
Sawyer	Partridge Crop Lake	12	medium-dense	10	sparse-medium
Vilas	Aurora Lake	24	sparse-dense	35	medium-dense
	Frost Lake	13	medium-dense	27	medium-dense
	Irving Lake	30	medium-dense	38	sparse-dense
	Island Lake	70	sparse-medium	54	medium-dense
	Lower Ninemile Lake	48	sparse-dense	40	medium-dense
	Nixon Lake	12	medium-dense	25	medium-dense
	Rice Creek <sup>3</sup>	18	sparse-medium	18	dense
	Rice Creek <sup>4</sup>	22	medium-dense	8	medium-dense
	Upper Ninemile Lake	33	medium-dense	35	medium-dense
Washburn	Long, Mud, & Little Mud Lakes	27	medium-dense	18	medium
	Trego Flowage	20	medium-dense	7	medium-dense

<sup>1</sup> Near Hertel; <sup>2</sup> NW of Lennox; <sup>3</sup> N of Island Lake <sup>4</sup> N of Big Lake



## Harvest Estimation

Responses were obtained from 291 tribal permit holders and 353 state licensees. Survey respondents were asked to report all harvest which occurred under their permit. For state licensees, this included on- and off-reservation harvest; for tribal members it included only off-reservation harvest, since no permit is required to harvest on-reservation. Forty-five of the tribal and 306 of the state licensees surveyed reported harvesting rice in 2008. The total number estimated active in each group were 153 tribal members and 564 state licensees (Table 4).

Tribal harvesters active off-reservation reported making from 1 to 10 ricing trips, averaging 3.6 trips. Tribal survey respondents made a total of 172 off-reservation harvesting trips, gathering 7,465 pounds of green rice (Appendix 1), with an extrapolated total harvest estimate of 24,055 pounds in 552 trips, an average of 44 pounds per trip (Table 4). The total off-reservation harvest per active license averaged 157 pounds.

Table 4. A comparison of tribal (off-reservation) and state manoomin harvest in 2008.

	NUMBER OF PERMIT HOLDERS	ESTIMATED NUMBER ACTIVE	AVERAGE NUMBER OF TRIPS	AVERAGE HARVEST/ TRIP	AVE. HARVEST/ ACTIVE LICENSE	TOTAL ESTIMATED HARVEST / TRIPS
TRIBAL	1,306	153	3.6	44	157	24,055 / 552
STATE	651	564	2.6	35	89	50,434 / 1,456
TOTAL	1,957	717	2.8	37	104	74,489 / 2,008

In comparison, active state licensees reported making from 1 to 15 ricing trips, averaging 2.6 trips. Collectively, state survey respondents made 790 trips, gathering 27,363 pounds of green rice (Appendix 1), with an extrapolated total harvest estimate of 50,434 pounds in 1,456 trips, an average of 35 pounds per trip. The harvest per active state license averaged 89 pounds.

The amount of rice harvested per individual varied greatly (Table 5). The most reported by a state ricer was 1000 pounds, while the most reported by a tribal ricer was 600 pounds. On the low end of the range, the 29% of tribal ricers who harvested a total of 50 pounds or less was similar to the 30% reported from 2007 (David, 2009), but the percentage of state ricers harvesting a total of 50 pounds or less fell from 69% in 2007 to 53% in 2008.

Eighty-seven percent of the state-licensed respondents gathered rice in 2008, versus 12% for the tribes. Differences in permit systems between the two groups accounts for the different activity levels observed. The tribal ricing permit is a simple check-off category on a general natural resources harvesting permit available at no cost to tribal members. The category is frequently checked by individuals whose primary interest is one of the other harvest activities listed on the permit. The state permit is a unique license available for a fee, and thus is rarely obtained by individuals without a strong intention of ricing. The tribal activity rate is also lowered because members are asked to respond only if they harvested rice off-reservation. When on-reservation rice beds have good stands, many tribal ricers concentrate their efforts there.

Table 5. Distribution of harvest among active respondents to the 2008 harvest survey.			
TRIBAL			
POUNDS OF GREEN RICE HARVESTED	INDIVIDUALS		PERCENT OF TOTAL HARVEST
	NUMBER	PERCENT	
0 - 50	13	28.9	4.6
51 - 100	9	20.0	9.2
101 - 150	5	11.1	8.8
151 - 200	3	6.7	7.8
201 - 300	8	17.8	26.8
301 - 500	6	13.3	34.7
501 - 1000	1	2.2	8.0
1001 +	0	0.0	0.0
STATE			
POUNDS OF GREEN RICE HARVESTED	INDIVIDUALS		PERCENT OF TOTAL HARVEST
	NUMBER	PERCENT	
0 - 50	161	52.6	14.4
51 - 100	82	26.8	22.0
101 - 150	23	7.5	10.4
151 - 200	12	3.9	7.5
201 - 300	11	3.6	10.1
301 - 500	8	2.6	11.1
501 - 1000	9	2.9	24.4
1001 +	0	0.0	0.0

The data collected in this survey can be used to estimate off-reservation harvest by tribal permit holders, and both total and off-reservation harvest by state licensees. It cannot be used to estimate on-reservation harvest by tribal members, who are not required to have a permit to harvest on-reservation.

Using the approach to estimate harvest described above in the Methods section, total off-reservation harvest for tribal permit holders was estimated at 24,055 pounds of green rice and the total harvest for state permittees was estimated at 50,433 pounds (Table 4). Since all but 131 pounds of the 2008 state harvest came from off-reservation waters, the total off-reservation harvest was estimated at 74,247 pounds, with tribal ricers accounting for 32% of the harvest.

This off-reservation harvest estimate is 17% higher than the 2007 estimate of 63,243 pounds (David, 2009). The 2008 harvest estimate is unusual in that while the state harvest estimate increased 51% from 2007 the tribal harvest estimate declined 20%.

The increase in estimated harvest for state ricers would appear to be inconsistent with the decline in the abundance index (Figure 3). Part of the increase is likely attributable to the increase in active state ricers, which increased 11% from 2007. Additional reasons for this are largely conjecture, but they may be related to: 1) state ricers making a more determined effort to pick after the relatively poor harvest in 2007 (harvest per trip increased from 25 to 34 pounds);

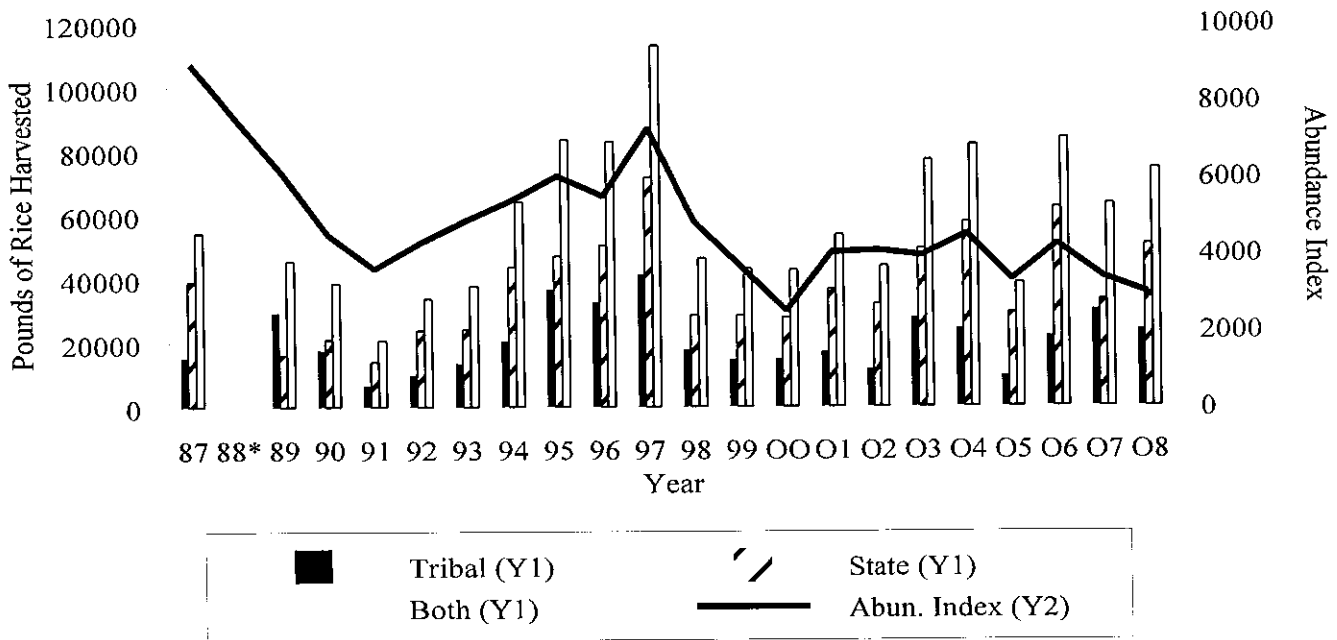


Figure 3. Harvest trends versus abundance index, 1987-2008 (\* no harvest estimates for 1988).

2) relatively light harvest pressure levels relative to crop abundance - allowing pickers to find an adequate number of good stands even when the crop as a whole is poor, or 3) better weather during the harvest period. Regarding the latter of these, many comments were made in 2007 related to harvest being limited by shallow water or storms.

While the decline in tribal harvest appears more consistent with the decline in the abundance index, it could also be attributable to a shift in on-reservation versus off-reservation harvest. This would be particularly true for members of the Bad River Tribe, who could not rice on-reservation in 2007 due to the beds being closed.

It is also important to remember that the abundance index uses acreage and stand density factors to create an index to seed abundance, but this methodology does not measure actual seed production which is much more difficult to monitor. In 2007, there were more reports of “ghost” rice, or empty hulls, contributing to the low harvest reported that year. In addition, evidence from the paddy rice industry indicates that seed production declines in dense stands. It is possible that seed production was above average under the relatively low stand densities observed in 2008. This also suggests that our abundance index may over-estimate seed production in years when average stand density is high.

The distribution of ricing effort and harvest has tended to reflect the distribution of rice waters in the state, and the abundance of rice on those waters (Figure 4). The percentage of the total harvest which came from Burnett County (24%) was lower than the 1992-2008 average of 33%, while the percentages coming from Douglas and Price counties (20% and 9% respectively) were higher than the long term averages of 9% and 2%. At least one pound of harvest was reported for 102 different named waters, versus 98 sites in 2007 (David, 2009), marking the first time the total of number of waters riced reached 3 digits. Respondents also reported visiting 4 additional sites which produced no harvest.

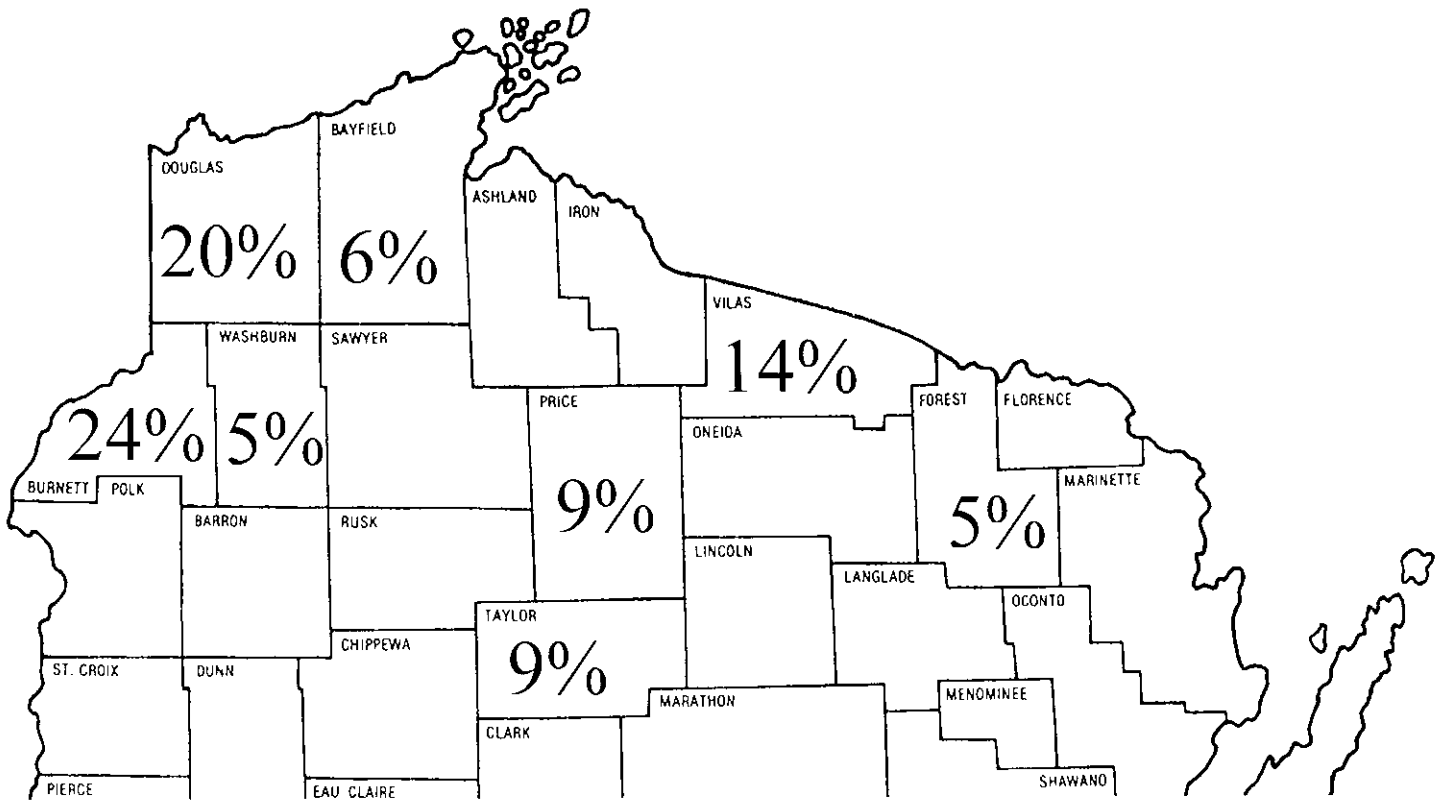


Figure 4. Distribution of counties accounting for 5% or more of the manoomin harvest reported by county by respondents to the 2008 harvest survey, tribal and state harvesters combined.

Less than 1% of the harvest reported by state licensees came from waters outside the ceded territory (Appendix 1). At least 27% of the harvest reported from named locations came from sites planted by the WDNR, the U.S. Forest Service, GLIFWC, or other seeding cooperators. This was down slightly from 31% in 2007, and similar to the 26% observed in 2006. Two of the 5 sites most heavily harvested in 2008 had been seeded, including the Spring Creek Wildlife Area in Price County, the second-most heavily harvested location. (Seeded sites are noted with an asterisk in Appendix 1.)

### Opinions of Respondents

Annual Abundance: Individuals were asked if they felt the 2008 wild rice crop was better, the same, or worse than the 2007 crop. Among the 235 active respondents with an opinion, 33% felt 2008 was worse than 2007, 32% felt both years were about the same, and 35% were of the opinion that 2008 was better than 2007.

Collectively, these opinions correlated fairly well with results from the abundance surveys of 40 rice waters discussed earlier, which showed a relatively small (9%) decrease in abundance state-wide between years.

Rice Worm Abundance: For the fifth consecutive year, survey respondents were asked how they rated the abundance of “rice worms” (larvae stage of the moth *Apamea apamiformis*) in the current year. Among the 289 respondents who expressed an opinion, 20% rated them as very low, 46% as low, 19% as average, 8% as medium high, and 7% as high. These figures suggest that overall rice worm abundance in 2008 was similar to 2007 (Figure 5), but with somewhat higher and lower abundance in some areas, and fewer areas with an average abundance level. Individuals who rice multiple areas often report different abundance levels on different sites.

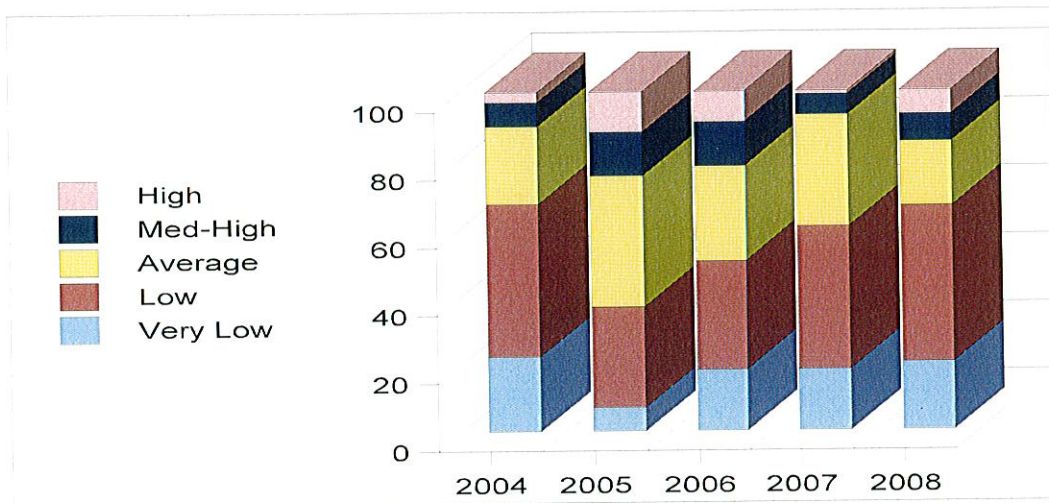


Figure 5. Opinions of manoomin harvest survey respondents on the abundance of rice worms, 2004 through 2008.

Comments: Respondents offered a number of comments, mostly about the abundance of the crop and/or rice worms on individual waters.

Unlike 2007, there were fairly few comments about low water levels or storms reducing the crop, although two individuals noted that Lower Steve Creek Flowage in Price County had a good crop but could not be picked due to low water.

A number of respondents expressed concern about particular bodies of water. Clam Lake in Burnett County was a concern for 7 respondents, and Bear Lake in Barron County for two. Spur Lake (Oneida), Little Butternut (Polk), Mulligan Lake (Douglas), and the St. Croix Flowage (Douglas) were mentioned once each, while one person also felt that the Phipps Flowage (Sawyer) on the St. Croix/Namekagon National Scenic Riverway had been hurt by a lowering of the old logging dam.

Only three complaints were made about the opening of date-regulated waters, compared to 13 in 2007, (despite a 9% increase in the number of respondents) and there were no reports of “ghost rice” or empty hulls compared to 8 in 2007 (David, 2009). The reduction in these complaints possibly adds credence to the idea that the high number of complaints in 2007 was at least in part the product of people finding little rice because of poor pollination or drought stress. Three people noted that the season ran unusually late in 2008.

Two respondents felt that a list of processors needs to be developed, as well as information on how to finish rice yourself. No other comment was made by more than 1 individual.

Several people discussed seeding efforts. One mentioned seeding the Jersey Flowage in Lincoln County, while others mentioned that some of the rice harvested was used to seed McMillan Marsh in Marathon County, Lake Mills WA in Jefferson County, or Rice Lake near Hertel (Burnett) (in conjunction with the St. Croix Tribe). One person asked if was alright to seed, while another felt that only historic sites should be seeded.

**Potential Waters for Seeding or Other Restoration:** Respondents suggested 19 different waters which might be candidates for seeding or other restoration efforts. Sites named are listed in Appendix 2.

## LITERATURE CITED

- Andryk, T. 1986. Wild rice wetland inventory of northwest Wisconsin. Great Lakes Indian Fish and Wildlife Commission Administrative Report 86-4. 51 pp.
- David, P.F. 2001. Wild rice abundance and harvest in the Wisconsin Ceded Territories in 1999. Great Lakes Indian Fish and Wildlife Commission Administrative Report 01-02. 16 pp.
- David, P.F. 2008. Wild rice (manoomin) abundance and harvest in the Wisconsin Ceded Territories in 2003. Great Lakes Indian Fish and Wildlife Commission Administrative Report 08-20. 15 pp.
- David, P.F. 2009. Wild rice (manoomin) abundance and harvest in Northern Wisconsin in 2007. Great Lakes Indian Fish and Wildlife Commission Administrative Report 09-01. 16 pp.

Appendix 1. Ricing trips and pounds of green manoomin harvested by respondents to the 2008 harvest survey.  
Seeded waters are marked by an asterisk.

COUNTY	WATER	TRIBAL		STATE		COMBINED TOTAL	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Ashland	Kakagon Sloughs	0	0	2	100	2	100
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>100</b>	<b>2</b>	<b>100</b>
Barron	Bear Lake	0	0	4	149	4	149
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>149</b>	<b>4</b>	<b>149</b>
Bayfield	Chippewa Lake*	8	360	46	1,239	54	1,599
	Totagatic Lake	7	130	16	392	23	522
	Unnamed	0	0	1	125	1	125
	<b>Subtotal</b>	<b>15</b>	<b>490</b>	<b>63</b>	<b>1,756</b>	<b>78</b>	<b>2,246</b>
Burnett	Briggs Lake	9	535	9	548	18	1,083
	Clam River Flow.	0	0	9	394	9	394
	Culbertson Lake	0	0	2	30	2	30
	Duckshot Lake	0	0	1	15	1	15
	Gaslyn Lake	0	0	1	5	1	5
	Gull Lake	1	100	0	0	1	100
	Hay Creek Flow.*	0	0	1	5	1	5
	Johnsons Marsh	0	0	2	75	2	75
	Long Lake	4	135	46	2,161	50	2,296
	Loon Lake	3	150	10	488	13	638
	Lower L Dike Flow.*	0	0	1	10	1	10
	Mud Lake	0	0	5	285	5	285
	North Fork Flow.*	0	0	19	502	19	502
	North Lang Lake	0	0	5	194	5	194
	Phantom Flow.*	6	300	64	1,951	70	2,251
	St Croix River	0	0	1	55	1	55
	Unnamed	0	0	1	27	1	27
	Webb Creek	0	0	5	228	5	228
	Yellow Lake	0	0	3	51	3	51
	Yellow River	0	0	1	16	1	16
<b>Subtotal</b>	<b>23</b>	<b>1,220</b>	<b>186</b>	<b>7,040</b>	<b>209</b>	<b>8,260</b>	
Douglas	Allouez Bay	1	20	0	0	1	20
	Amnicon Lake	0	0	1	0	1	0
	Bear Lake	1	75	6	204	7	279
	Minong Flow.	32	1,530	55	1,825	87	3,355
	Pokegama River	0	0	2	5	2	5
	Radigan Flow.	0	0	3	174	3	174
	St. Croix Flow.	6	440	1	10	7	450
	St. Croix River	13	905	37	1,633	50	2,538
	Upper Ox Lake	0	0	2	36	2	36
	<b>Subtotal</b>	<b>53</b>	<b>2,970</b>	<b>107</b>	<b>3,887</b>	<b>160</b>	<b>6,857</b>
Forest	Little Rice Lake	2	100	17	939	19	1,039
	Rat River	2	105	1	130	3	235
	Rice Lake	0	0	1	25	1	25
	Scattered Rice Lake	0	0	1	15	1	15
	Scott Lake	1	40	0	0	1	40
	Wabicon Lake	5	175	2	120	7	295
	<b>Subtotal</b>	<b>10</b>	<b>420</b>	<b>22</b>	<b>1,229</b>	<b>32</b>	<b>1,649</b>

(Appendix 1 continued on the next page.)

Appendix 1 (cont.). Ricing trips and pounds of green manoomin harvested by respondents to the 2008 harvest survey. Seeded waters are marked by an asterisk.

COUNTY	WATER	TRIBAL		STATE		COMBINED TOTAL	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Iron	Bear Lake	0	0	1	15	1	15
	Little Turtle Flow.*	0	0	2	10	2	10
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>25</b>	<b>3</b>	<b>25</b>
Langlade	Lily River	0	0	1	75	1	75
	Spider Creek Flow.	0	0	1	0	1	0
	Wolf River	2	30	0	0	2	30
	<b>Subtotal</b>	<b>2</b>	<b>30</b>	<b>2</b>	<b>75</b>	<b>4</b>	<b>105</b>
Lincoln	Alice Lake	0	0	9	101	9	101
	Pine Creek	0	0	4	83	4	83
	Wisconsin River	0	0	9	319	9	319
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>22</b>	<b>503</b>	<b>22</b>	<b>503</b>
Marquette	Harrisville Mill Pond	0	0	5	46	5	46
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>46</b>	<b>5</b>	<b>46</b>
Oneida	Gary Lake	0	0	3	80	3	80
	Rhineland Flow.	4	150	4	10	8	160
	Spur Lake	2	75	0	0	2	75
	The Thoroughfare	1	0	8	155	9	155
	Wisconsin River	0	0	6	72	6	72
	Wolf River	10	445	1	120	11	565
	<b>Subtotal</b>	<b>17</b>	<b>670</b>	<b>22</b>	<b>437</b>	<b>39</b>	<b>1,107</b>
Polk	Apple River	0	0	1	8	1	8
	Joel Flow.*	0	0	16	284	16	284
	Little Butternut Lake	0	0	1	0	1	0
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>18</b>	<b>292</b>	<b>18</b>	<b>292</b>
Price	Lower Steve Creek Flow.*	0	0	3	89	3	89
	Sailor Lake*	0	0	1	3	1	3
	Spring Creek WA*	0	0	39	2,868	39	2,868
	Unnamed	0	0	1	200	1	200
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>44</b>	<b>3,160</b>	<b>44</b>	<b>3,160</b>
Sawyer	Barker Lake	1	2	0	0	1	2
	Billy Boy Flow.	0	0	1	6	1	6
	Blaisdell Lake	1	50	8	81	9	131
	Moose Lake	0	0	1	1	1	1
	Mosquito Brook	0	0	1	6	1	6
	Nelson Lake	4	4	5	67	9	71
	Pacwawong Flow.	4	100	11	40	15	140
	Partridge Crop Lake	0	0	1	8	1	8
	Phipps Flow.	4	140	3	33	7	173
	Teal Lake	0	0	1	0	1	0
	Unnamed	0	0	1	20	1	20
	W. Fork Chippewa River	0	0	4	16	4	16
<b>Subtotal</b>	<b>14</b>	<b>296</b>	<b>37</b>	<b>278</b>	<b>51</b>	<b>574</b>	

(Appendix 1 continued on the next page.)



Appendix 1 (cont.). Ricing trips and pounds of green manoomin harvested by respondents to the 2008 harvest survey. Seeded waters are marked by an asterisk.							
COUNTY	WATER	TRIBAL		STATE		COMBINED TOTAL	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Taylor	Chequamegon Waters Flow.*	2	160	35	1,431	37	1,591
	Mondeaux Flow.	0	0	26	1,642	26	1,642
	<b>Subtotal</b>	<b>2</b>	<b>160</b>	<b>61</b>	<b>3,073</b>	<b>63</b>	<b>3,233</b>
Unnamed	Unnamed	0	0	2	30	2	30
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>30</b>	<b>2</b>	<b>30</b>
Vilas	Allequash Lake	1	50	9	110	10	160
	Aurora Lake	2	80	19	570	21	650
	Irving Lake	0	0	2	41	2	41
	Island Lake	3	100	5	90	8	190
	Lac Vieux Desert*	7	150	0	0	7	150
	Little Rice Lake	0	0	5	51	5	51
	Lost Creek	0	0	6	60	6	60
	Lower Ninemile Lake	1	25	25	1,312	26	1,337
	Manitowish River	0	0	8	229	8	229
	Nixon Lake	0	0	20	376	20	376
	Partridge Lake	2	45	2	40	4	85
	Rest Lake	0	0	1	4	1	4
	Rice Creek	0	0	5	59	5	59
	Rice Lake	0	0	2	4	2	4
	Round Lake	3	150	0	0	3	150
	Trout River	0	0	1	8	1	8
	Unnamed	0	0	2	15	2	15
	Upper Ninemile Flow.	9	299	14	993	23	1,292
	West Plum Lake	0	0	1	5	1	5
	Wisconsin River	0	0	1	25	1	25
<b>Subtotal</b>	<b>28</b>	<b>899</b>	<b>128</b>	<b>3,992</b>	<b>156</b>	<b>4,891</b>	
Washburn	Boyer Creek	0	0	1	15	1	15
	Little Mud Lake	0	0	5	95	5	95
	Long Lake	1	25	2	190	3	215
	Mud Lake	1	50	7	124	8	174
	Potato Creek	0	0	2	48	2	48
	Potato Lake	0	0	1	40	1	40
	Rocky Ridge Creek	0	0	2	55	2	55
	Spring Lake	2	35	5	165	7	200
	Totagatic River	0	0	6	112	6	112
	Tranus Lake	4	200	12	162	14	362
	Trego Flow.	0	0	4	30	4	30
	Unnamed	0	0	6	145	6	145
	Whalen Lake	0	0	3	83	3	83
	Yellow River	0	0	3	16	3	16
<b>Subtotal</b>	<b>8</b>	<b>310</b>	<b>59</b>	<b>1,280</b>	<b>65</b>	<b>1,590</b>	
Waupaca	Partridge Lake	0	0	1	5	1	5
	White Lake	0	0	2	6	2	6
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>11</b>	<b>3</b>	<b>11</b>
<b>Grand Total</b>		<b>172</b>	<b>7,465</b>	<b>790</b>	<b>27,363</b>	<b>962</b>	<b>34,828</b>

Appendix 2. Waters suggested for seeding or restoration by respondents to the 2008 wild rice harvest survey.*	
COUNTY	WATER
Barron	Butternut Lake Duck Lake Prairie Lake Tuscobia Lake
Bayfield	Bear Lake Beaver Lake Delta Lake Hay Lake Rainbow Lake (in the Rainbow Lake Wilderness Area)
Burnett	Fish Lake
Forest	Hay Meadow Flowage
Florence	Duck Lake Rat Lake
Oneida	Spur Lake (historic bed in decline)
Polk	Little Butternut (historic bed in decline)
Sawyer	Sobieski Flowage on the Flambeau River State Forest
Vilas	Clear Lake Middle Gresham Lake
Washburn	Davis (Chippanazie )Flowage (Note: there is a small amount of rice present at this site.)

\* Suggested waters with relatively well established beds not included.