



**Manomin (Wild Rice)  
Abundance and Harvest  
in Northern Wisconsin in 2010**

by  
Peter F. David  
Wildlife Biologist

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Biological Services Division

P.O. Box 9

Odanah, WI 54861

(715) 682-6619



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## **MANOOMIN (WILD RICE) ABUNDANCE AND HARVEST IN NORTHERN WISCONSIN IN 2010**

### **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 2010 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 four days between July 26 and August 16th. 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.

#### **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 1,019 individuals in 2010. When individuals obtained their 2010 permit, they were asked if they harvested rice the previous year. Thirty-nine percent (98/253) of the individuals who indicated they had riced in 2009 (categorized as "active" ricers) were surveyed by phone, as well as 20% (153/766) of those individuals who indicated they had not riced the previous year ("inactive" ricers) (Table 1).



The number of tribal members estimated to have harvested off-reservation in 2010 was determined 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, and then combined to estimate total tribal harvest.

Table 1. Summary of 2010 tribal off-reservation manoomin harvest survey sampling.					
GROUP	TOTAL NUMBER	# SURVEYED	% SAMPLED	% ACTIVE OFF-RESERVATION	EST. # ACTIVE OFF-RESERVATION
ACTIVE <sup>1</sup>	253	98	39%	29.6%	75
INACTIVE <sup>1</sup>	766	153	20%	2.6%	20
TOTAL	1,019	251	25%		95

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

State rickers were required to obtain a state license. A mail questionnaire was mailed to each of the 611 individuals who obtained a state license. All harvest estimates were made by expanding the results reported by the 294 respondents to the state survey (48% 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 43 additional waters surveyed only from the air are listed in Table 3. A total of 1,693 acres of wild rice was estimated for these 83 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 2010.

Survey results and field observations indicate that rice abundance in 2010 was well below average. Overall, the abundance index decreased 26% from 2009, with the drop being most pronounced among the northwest area waters (Table 2, Figures 1 and 2). In the northwest, the abundance index decreased on 11 waters, increased on 3, and was essentially unchanged on 7. Upper Clam Lake, perhaps the most significant lake in this region, had its fourth consecutive crop failure. Among north-central waters, 7 declined, 4 rose, and 7 were largely unchanged (Table 2, Figure 2). Overall, the 2010 index was just 58% of the long-term index average (1985-2010), and was the second lowest index over the 25 year period.

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



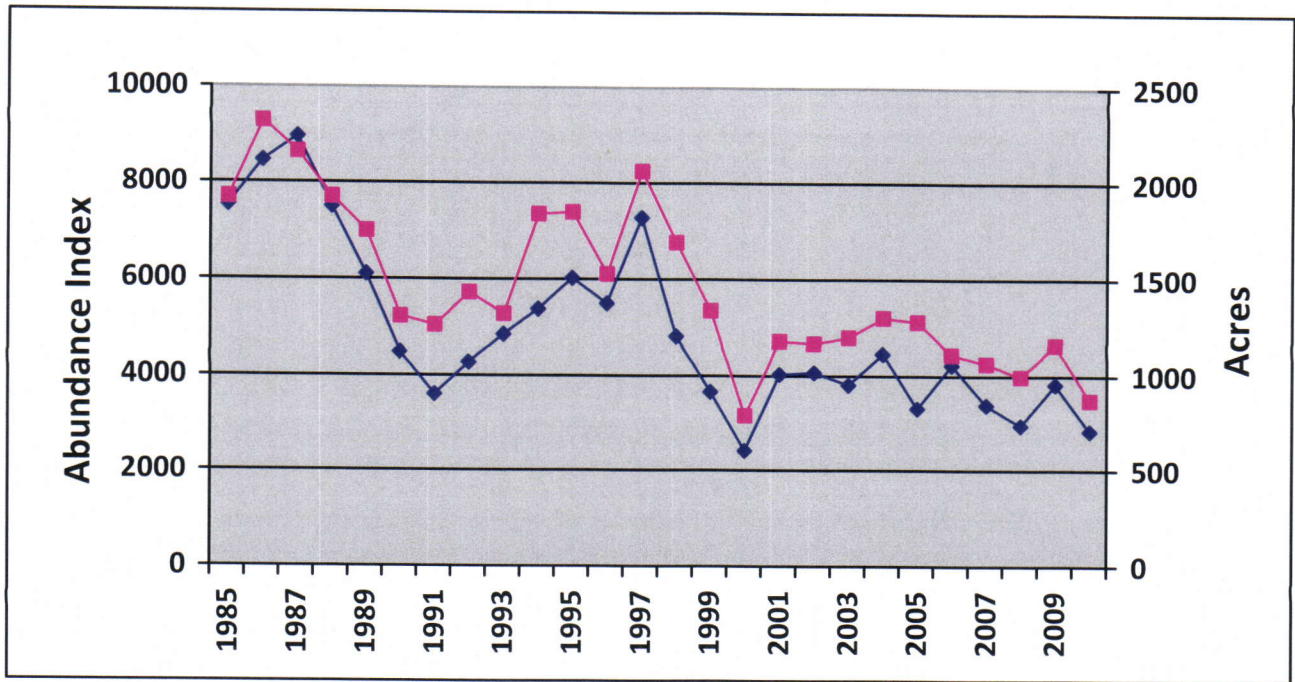


Figure 1. Manoomin abundance index and acreage from 40 Wisconsin rice waters surveyed annually from 1985-2010.

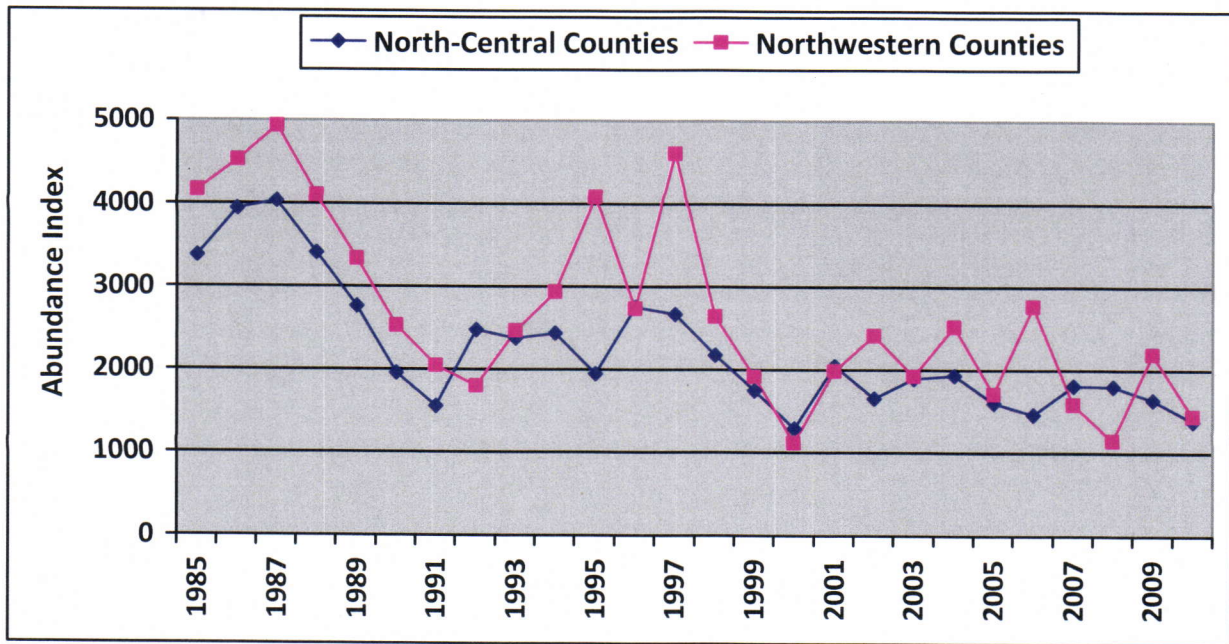


Figure 2. Manoomin abundance index from 40 Wisconsin rice waters surveyed annually from 1985-2010; northwestern versus north-central Wisconsin waters (HWY 13 used to separate northwestern from north-central waters).



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, weather/climate issues were unusually pronounced in 2010. Heavy early season rainfall events likely negatively impacted some beds, and led to a failure of the crop at the Spring Creek Wildlife Area in Price County when the water control structure failed. The 2010 season was also marked by unusually warm, wet weather during the emergent period; this apparently resulted in many rice stands being heavily infected with the fungal disease known as Brown Spot (Figure 3), which was more widespread than has previously been observed in our annual monitoring efforts.



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 3. Pacwawong Lake in 2010 with brown spot disease outbreak (top) compared to a year without the disease (2006).



Table 2. Manoomin acreage, density and abundance index from 40 Wisconsin waters for 2007-2010, and the 1985-2010 means.  
A density value of 1=sparse, 5=dense.  
(Data for 1985-2006 can be found in previous season reports.)

WATER	2007			2008			2009			2010			1985-2010		
	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	ACRES	DEN.	INDEX	MEAN ACRES	MEAN DEN.	MEAN INDEX
<b>NORTHWESTERN CTYS.</b>															
<b>BARRON</b>															
SWEENEY CREEK	1	4	4	1	1	1	8	3	24	3	5	15	9	2.6	31
<b>BAYFIELD</b>															
TOTOGATIC LAKE	215	1	215	54	1	54	180	2	360	81	2	162	154	2.5	439
<b>BURNETT</b>															
BASHAW LAKE	0	0	0	21	1	21	0	0	0	1	1	1	10	2.2	25
BIG CLAM LAKE	15	2	30	10	2	20	8	3	24	10	2	20	132	3.2	453
BRIGGS LAKE	33	4	132	25	4	100	21	4	84	8	3	24	27	3.8	106
GASLYN LAKE	28	4	112	6	2	12	16	3	48	20	3	60	22	3.1	78
LONG LAKE	65	4	260	64	3	192	120	4	480	40	3	120	69	2.7	193
MUD LAKE (2)	15	3	45	4	4	16	9	4	36	10	4	40	13	3.6	47
WEBB CREEK	15	5	75	11	5	55	9	4	36	2	4	8	12	4.0	55
<b>DOUGLAS</b>															
MULLIGAN LAKE	23	3	69	4	2	8	0	0	0	0	0	0	23	2.0	54
<b>POLK</b>															
RICE BED CREEK	15	5	75	19	5	95	15	4	60	10	3	30	11	4.3	51
RICE LAKE (1)			110*	15	3	45	50	5	250	45	3	135	46	3.3	162
WHITE ASH LAKE	5	3	15	10	3	30	12	2	24	19	4	76	12	3.2	39
<b>SAWYER</b>															
BILLY BOY FLOW.	7	2	14	16	3	48	15	3	45	1	1	1	12	2.3	40
BLAISDELL LAKE	90	1	90	50	3	150	80	2	160	45	1	45	76	2.7	204
PACWAWONG LAKE	40	3	120	35	2	70	80	4	320	115	5	575	86	3.7	337
PHIPPS FLOWAGE	5	3	15	23	4	92	25	4	100	14	3	42	28	3.9	110
<b>WASHBURN</b>															
DILLY LAKE	11	5	55	2	2	4	2	2	4	5	1	5	18	3.8	75
POTATO LAKE	4	3	12	13	3	39	20	4	80	7	2	14	13	3.0	41
RICE LAKE	7	3	21	9	3	27			58*	5	1	5	20	3.2	72
SPRING LAKE (1)	32	3	96	18	2	36	3	1	3	1	1	1	15	2.7	51
TRANUS LAKE	14	1	14	18	2	36	26	2	52	32	2	64	31	1.7	50
<b>SUBTOTAL</b>	<b>640</b>		<b>1579</b>	<b>428</b>		<b>1151</b>	<b>699</b>		<b>2248</b>	<b>474</b>		<b>1443</b>	<b>829</b>		<b>2678</b>
<b>NORTH-CENTRAL CTYS.</b>															
<b>FOREST</b>															
ATKINS LAKE	0	0	0	0	0	0	0	0	0	0	0	0	15	0.5	42
INDIAN/RILEY LAKE	1	1	1	2	1	2	4	3	12	1	3	3	5	2.9	15
PAT SHAY LAKE	2	2	4	6	1	6	15	2	30	25	3	75	33	1.6	56
RAT RIVER	15	5	75	13	3	39	18	4	72	2	2	4	20	4.5	95
WABIKON LAKE	40	4	160	70	4	280	74	3	222	80	3	240	48	2.8	139
<b>LINCOLN</b>															
ALICE LAKE	10	1	10	20	3	60	26	3	78	32	2	64	45	3.0	152
<b>ONEIDA</b>															
FISH LAKE	7	2	14	5	2	10	2	4	8	1	1	1	27	3.0	97
LITTLE RICE LAKE	0	0	0	0	0	0	0	0	0	0	0	0	6	1.1	24
RICE LAKE	3	1	3	35	1	35	0	0	0	10	2	20	56	1.3	97
SPUR LAKE	3	3	9	70	1	70	0	0	0	1	1	1	60	2.8	219
WISCONSIN RIVER	140	5	700	150	4	600	165	4	660	140	4	560	145	4.6	653
<b>PRICE</b>															
BLOCKHOUSE LAKE	0	0	0	0	0	0	0	0	0	0	0	0	14	2.2	49
<b>VILAS</b>															
ALLEQUASH LAKE	65	3	195	80	4	320	25	2	50	10	3	30	61	3.8	248
LITTLE RICE LAKE	54	5	270	45	3	135	48	4	192	8	3	24	19	2.8	63
MANITOWISH RIVER	14	5	70	14	5	70	17	4	68	16	5	80	15	4.5	70
PARTRIDGE LAKE	24	5	120	22	4	88	20	3	60	20	3	60	20	4.1	82
RICE LAKE	40	4	160	30	2	60	36	4	144	36	5	180	28	3.6	99
WEST PLUM LAKE	6	2	12	5	4	20	12	3	36	14	3	42	19	3.1	63
<b>SUBTOTAL</b>	<b>424</b>		<b>1803</b>	<b>567</b>		<b>1795</b>	<b>462</b>		<b>1632</b>	<b>396</b>		<b>1384</b>	<b>626</b>		<b>2232</b>
COUNT:			39			40			40			40			40
<b>TOTAL:</b>	<b>1064</b>		<b>3382</b>	<b>995</b>		<b>2946</b>	<b>1161</b>		<b>3880</b>	<b>870</b>		<b>2827</b>	<b>1478</b>		<b>4910</b>
AVERAGE:			84			74			97			71			128

\*water not surveyed; index value estimated as discussed in 2007 and 2009 abundance and harvest reports (David 2009; David, 2010).



Table 3. Estimated manoomin acreage and density for waters aerially surveyed in 2010.

COUNTY	WATER	2010 EST. ACRES	2010 EST. DENSITY	2009 EST. ACRES	2009 EST. DENSITY
Barron	Bear Lake	16	medium	27	medium
Bayfield	Chippewa Lake	45	medium-dense	28	medium-dense
Burnett	Black Brook Flowage	1	sparse	3	medium
	Grettum Flowage	25	dense	140	medium-dense
	Loon Lake (Carters Bridge)	22	medium	24	medium
	Lower Hay Creek Flowage	5	sparse	19	medium
	Mud Lake (Oakland Township)	45	medium	30	medium
	North Fork Flowage	15	sparse	60	medium
	North Lang Lake	2	dense	4	dense
	Phantom Flowage	10	medium	145	medium-dense
	Rice Lake <sup>1</sup>	5	medium	40	dense
Douglas	Lower Ox Lake	10	sparse	12	medium
	Minong Flowage (Smiths Bridge)	5	medium	30	medium-dense
	Radigan Flowage	10	sparse	40	dense
	St. Croix (Gordon) Flowage	6	medium	12	medium
	St.Croix River/Cutaway Dam	26	medium	45	medium-dense
	Upper Ox Lake	4	dense	5	dense
Forest	Hiles Millpond	15	medium	10	medium
	Little Rice Flowage	40	medium	245	medium-dense
	Scott Lake	2	medium	10	medium
Iron	Little Turtle Flowage	not surveyed		2	sparse
	Mud Lake	6	sparse-medium	19	medium
Langlade	Daily Pond	11	medium	11	medium
	Miniwaukan Lake	7	medium	11	medium-dense
	Pickereel Creek (Goose Island)	0	-	8	medium-dense
	Spider Creek Flowage	18	medium	37	medium-dense
Oneida	Big Lake	15	medium-dense*	11	dense
	Cuenin Lake	16	medium-dense*	19	dense
	Fourmile Lake	13	medium-dense*	16	medium-dense
	Roe Lake	not surveyed		3	sparse-medium
	The Thoroughfare	86	medium-dense*	75	medium-dense
	Wolf River <sup>2</sup>	not surveyed		20	dense
Polk	Somers Lake	9	medium-dense	11	dense
Price	Lower Steves Creek Flowage	not surveyed		10	dense*
	Spring Creek WA Flowages <sup>3</sup>	0	-	135	medium-dense
Sawyer	Partridge Crop Lake	5	medium	4	medium
Vilas	Aurora Lake	60	medium-dense*	65	medium-dense
	Frost Lake	5	sparse	37	medium-dense
	Irving Lake	45	sparse-medium	36	medium-dense
	Island Lake	85	sparse-dense	75	sparse-medium
	Lower Ninemile Lake	5	sparse	38	sparse-dense
	Nixon Lake	10	dense	20	sparse-dense
	Rice Creek <sup>4</sup>	28	sparse-medium	12	sparse-medium
	Rice Creek <sup>5</sup>	16	medium-dense	16	medium-dense
	Upper Ninemile Lake	30	medium-dense*	36	medium-dense
Washburn	Long, Mud, & Little Mud Lakes	24	medium-dense	31	medium-dense
	Trego Flowage	20	dense	26	dense

<sup>1</sup> Near Hertel; <sup>2</sup> NW of Lennox; <sup>3</sup> Water control structure failure; <sup>4</sup> N of Island Lake; <sup>5</sup> N of Big Lake  
\* Site appeared highly infected with Brown Spot disease.

## Harvest Estimation

Responses were obtained from 251 tribal permit holders and 294 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. Thirty-three of the tribal and 222 of the state licensees surveyed reported harvesting rice in 2010. The total number estimated active in each group were 95 tribal members and 463 state licensees (Table 4).

Tribal harvesters active off-reservation reported making from 1 to 8 ricing trips, averaging an estimated 2.8 trips. Tribal survey respondents made a total of 97 off-reservation harvesting trips, gathering 781 pounds of green rice (Appendix 1), with an extrapolated total harvest estimate of 2,032 pounds in 263 trips, an average of 8 pounds per trip (Table 4). The total off-reservation harvest per active tribal license averaged 21 pounds.

Table 4. A comparison of tribal (off-reservation) and state manoomin harvest in 2010.

	NUMBER OF PERMIT HOLDERS	ESTIMATED NUMBER ACTIVE	AVERAGE NUMBER OF TRIPS	AVERAGE HARVEST/ TRIP	AVE. HARVEST/ ACTIVE LICENSE	TOTAL ESTIMATED HARVEST / TRIPS
TRIBAL	1,019	95	2.8	8	21	2,032 / 263
STATE	611	463	2.2	10	22	10,302 / 1,032
TOTAL	1,630	558	2.3	10	22	12,334 / 1,295

In comparison, active state licensees reported making from 1 to 19 ricing trips, averaging 2.2 trips. Collectively, state survey respondents made 495 trips, gathering 4,939 pounds of green rice (Appendix 1), with an extrapolated total harvest estimate of 10,302 pounds in 1,032 trips, an average of 10 pounds per trip. The harvest per active state license averaged 22 pounds.

The amount of rice harvested per individual varied greatly (Table 5). The most reported by a state ricer was 400 pounds, while the most reported by a tribal ricer was 125 pounds. On the low end of the range, the percentage of tribal ricers who harvested a total of 50 pounds or less rose from 40% in 2009 (David, 2010) to 85%; similarly for state ricers, the figure rose from 42% in 2009 to 91%.

An estimated 76% of the state-licensed ricers (463/611) gathered rice in 2010, versus 9% for the tribes (95/1,019)(Table 4). 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 2010 harvest survey.			
TRIBAL			
POUNDS OF GREEN RICE HARVESTED	INDIVIDUALS		PERCENT OF TOTAL HARVEST
	NUMBER	PERCENT	
0 - 50	28	84.9	43.7
51 - 100	4	12.1	40.3
101 - 150	1	3.0	16.0
151 - 200	0	0.0	0.0
201 - 300	0	0.0	0.0
301 - 500	0	0.0	0.0
501 - 1000	0	0.0	0.0
1001 +	0	0.0	0.0
STATE			
POUNDS OF GREEN RICE HARVESTED	INDIVIDUALS		PERCENT OF TOTAL HARVEST
	NUMBER	PERCENT	
0 - 50	201	90.5	47.1
51 - 100	12	5.4	17.4
101 - 150	4	1.8	9.3
151 - 200	3	1.4	11.3
201 - 300	0	0.0	0.0
301 - 500	2	0.9	14.9
501 - 1000	0	0.0	0.0
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 2,032 pounds of green rice and the total harvest for state permittees was estimated at 10,302 pounds (Table 4). Since none of the harvest reported by state licensees in 2010 came from on-reservation waters, the total off-reservation harvest was estimated at 12,334 pounds, with tribal ricers accounting for 16% of the harvest.

These harvest figures make 2010 the poorest harvest year on record, which followed the best harvest year since surveys were begun (Figure 4 & Appendix 2). The 2010 off-reservation harvest estimate of 12,334 pounds is only 11% of the 2009 estimate of 114,523 pounds and only 19% of the average harvest estimates made from 1992-2009. It is also only 37% of the lowest harvest estimate previously made (33,650 pounds in 1992). Estimates of state and tribal harvest per trip, and harvest per active license, were record lows in 2010, as was the percentage of state license buyers who actually riced.



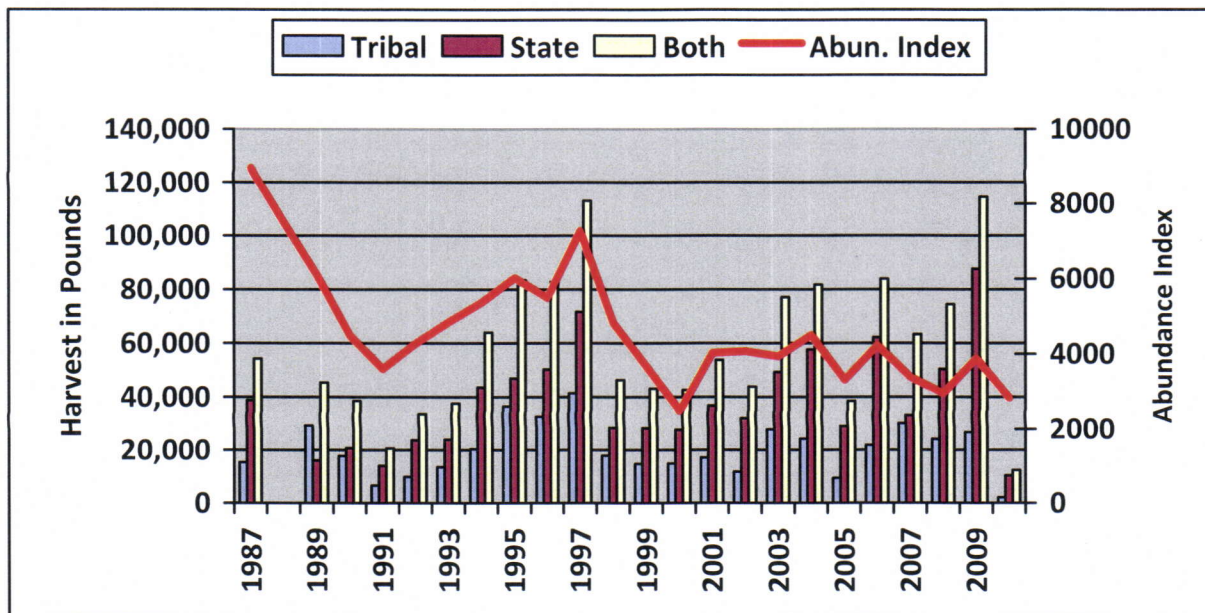


Figure 4. Harvest trends versus abundance index, 1987-2010 (\* no harvest estimates for 1988).

It is also important to remember that the abundance index uses acreage and stand density factors to create an index of seed abundance, but this methodology does not measure actual seed production. Evidence from the paddy rice industry indicates that infections of brown-spot disease can cause marked reductions in seed production, and this is undoubtedly true in natural stands as well. This suggests that our abundance index over-estimates seed production in years when brown-spot prevalence is high, as it was in 2010. While brown-spot outbreaks were not particularly notable for many years, they appeared to markedly affect rice harvest in 2005, and especially in 2010, two of the warmest years in the last century. If climate change is increasing the frequency of brown-spot outbreaks, it may be worthwhile to develop an index to the annual prevalence of this disease.

The abundance index also does not account for weather conditions during the harvest period which may influence harvest levels. Unlike 2009, when many ricers noted the occurrence of ideal weather during the harvest period, the 2010 harvest window was marked by many rain and high wind events that also contributed to the low harvest.

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 harvest in 2010 was more concentrated than usual however. For example, the number of counties which accounted for at least 5% of the harvest fell from 8 in 2009 to 5 in 2010. Vilas, Forest and Bayfield counties each accounted for 8-11% more of the total harvest than usual (with “usual” defined as the 1992-2009 average), while other counties accounted for less than usual, with the biggest decline being in Burnett County, which provided 9% less than usual. In addition, in 2009, at least 1 pound of harvest was reported from 102 different waters (David, 2010) compared to only 70 in 2010 (including 11 sites with only 1 pound of reported harvest) and in 2009 respondents reported visiting only 5 sites which produced no harvest compared to 25 in 2010.

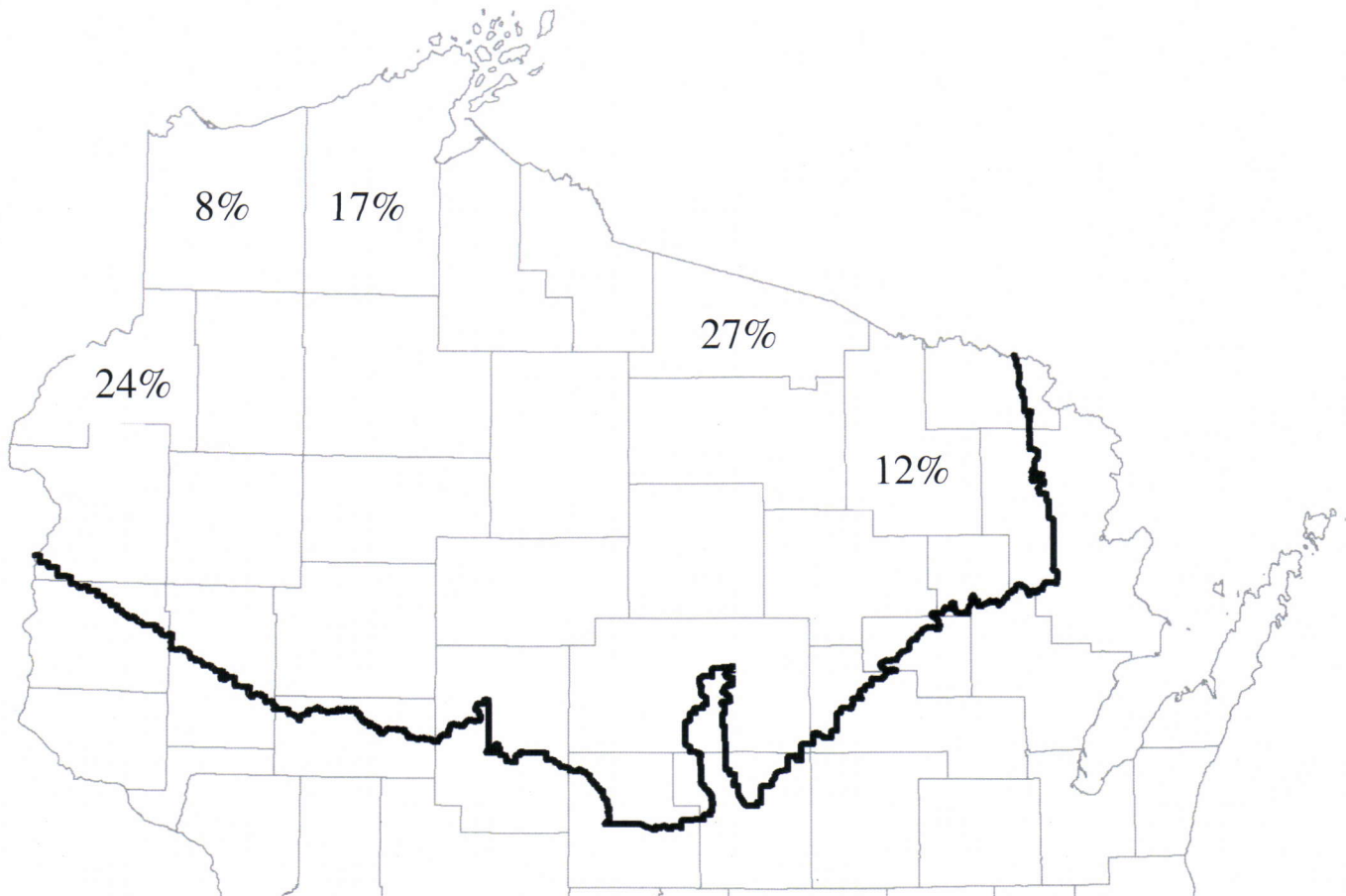


Figure 4. Distribution of counties accounting for 5% or more of the manoomin harvest reported by respondents to the 2010 harvest survey, tribal and state harvesters combined. (Heavy line is approximate ceded territory boundary.)

Only 9 of the 4,939 pounds of rice reported harvested by state survey respondents came from waters outside the ceded territory in 2010(Appendix 1). Slightly over 18% of the harvest reported from named locations came from sites planted by the WDNR, the U.S. Forest Service, GLIFWC, or other seeding cooperators, including the most heavily harvested site (Chippewa Lake, Bayfield County). (Seeded sites are marked with an asterisk in Appendix 1.) This was down from 24% in 2009, 27% in 2008, 31% in 2007, and 26% in 2006.

The second most heavily harvested location, Mud Lake in Oakland Township, Burnett County, was also the site of restoration efforts. A new culvert was installed on the outlet of that lake in the fall of 2009, in cooperation with the town. The new culvert replaced a perched one, restoring historic hydrology at the site. Interestingly, the remnant seed bank was adequate for significant bed recovery despite the lack of a strong stand for roughly 20 years at that site.

### Opinions of Respondents

Annual Abundance: Individuals were asked if they felt the 2010 wild rice crop was better, the same, or worse than the 2009 crop. Among the 206 active respondents with an opinion, 98% felt



2010 was worse than 2009, while just 1% each felt the crop was the same or better. This high level of agreement, which has not previously been observed, is likely the product not only of the very poor crop in 2010, but also the very good crop in 2009.

Rice Worm Abundance: For the seventh 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 177 respondents who expressed an opinion, 8% rated them as very low, 19% as low, 36% as average, 20% as medium high, and 17% as high (Figure 5).

While these figures suggest a modest decline in rice worm abundance from 2009, they still represent the second highest abundance ratings reported since this question was added to the survey in 2004.

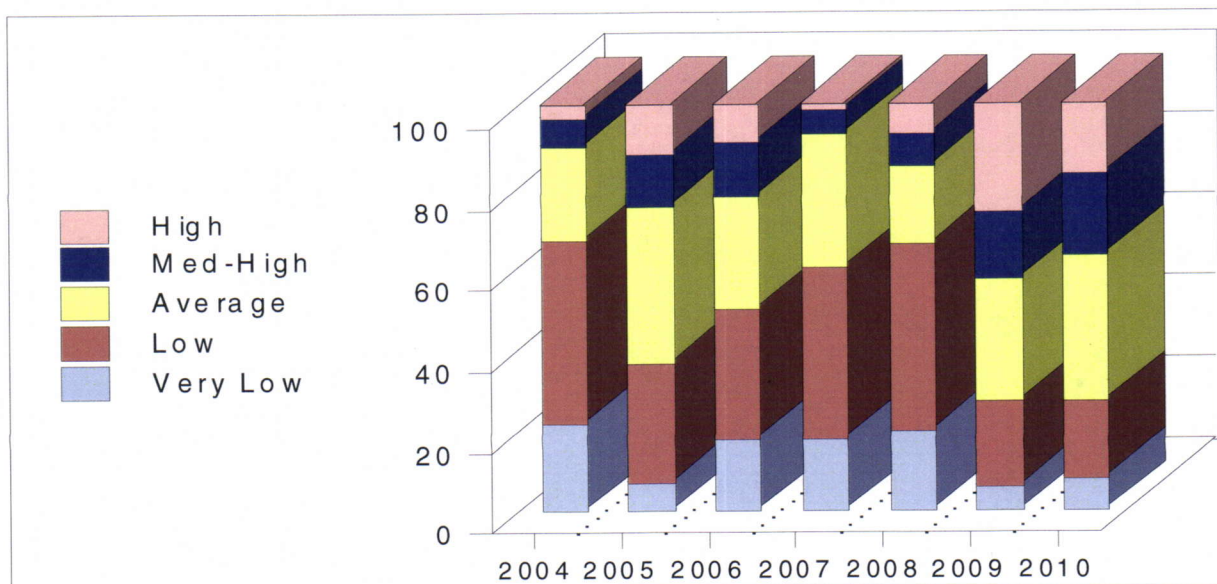


Figure 5. Opinions of manoomin harvest survey respondents on the abundance of rice worms, 2004 through 2010.

Comments: Respondents offered a large number of comments. In stark contrast to 2009, when the highest number of comments related to it being an exceptionally good season, the vast majority of the comments made in 2010 pertained to it being a very poor year, with 50 individuals making some comment about the limited nature of the crop, which was frequently described as “horrible”, “terrible” or the “worst year ever”. Related to these were comments about harvest being reduced by wind or rain (n=10), or noting an unusually high incidence of empty hulls (n=9). However, despite the poor conditions, five first-time ricers commented on how much they enjoyed the experience.

As in other years with poor crops, there were also a relatively large number of comments pertaining to date-regulated lakes being opened too late (n=13), or with individuals noting they went out too late, finding little seed (n=13). It is likely that in some of these instances, the issue was not actually lateness of opening or harvesting effort, but that no appreciable amount of seed was ever available for harvest.



Few other comments were made by more than 1-2 individuals, although five people felt the opening of date-regulated waters needs to be improved, and another four expressed thanks for management efforts.

**Potential Waters for Seeding or Other Restoration:** Respondents suggested 22 different waters which might be candidates for seeding or other restoration efforts. Sites named are listed in Appendix 3. (Sites already supporting well-established beds, and sites without flowing water were not included.)

### **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. 2009. Wild rice (manoomin) abundance and harvest in northern Wisconsin in 2007. Great Lakes Indian Fish and Wildlife Commission Administrative Report 08-22. 16 pp.
- David, P.F. 2010. Wild rice (manoomin) abundance and harvest in northern Wisconsin in 2009. Great Lakes Indian Fish and Wildlife Commission Administrative Report 08-22. 17 pp.

Appendix 1. Ricing trips and pounds of green manoomin harvested by respondents to the 2010 harvest survey. Seeded waters are marked by an asterisk.							
COUNTY	WATER	TRIBAL		STATE		COMBINED	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Barron	Bear Lake	0	0	5	53	5	53
	Lake Chetek	0	0	1	0	1	0
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>53</b>	<b>6</b>	<b>53</b>
Bayfield	Chippewa Lake*	18	169	47	707	65	876
	Totogatic Lake	18	57	13	47	31	104
	<b>Subtotal</b>	<b>36</b>	<b>226</b>	<b>60</b>	<b>754</b>	<b>96</b>	<b>980</b>
Burnett	Briggs Lake	3	0	6	191	9	191
	Clam Lake, Upper	0	0	1	0	1	0
	Clam River Flowage	0	0	6	54	6	54
	Cranberry Marsh/Unnamed	0	0	2	0	2	0
	Eagle Lake	0	0	1	1	1	1
	Gaslyn Lake	0	0	9	0	9	0
	Long Lake	0	0	22	127	22	127
	Loon Lake	2	30	3	5	5	35
	Mud Lake (1) (Swiss Township)	0	0	2	3	2	3
	Mud Lake (2) (Oakland Township)	2	26	36	727	38	753
	North Fork Flowage*	0	0	6	10	6	10
	North Lang Lake	0	0	1	10	1	10
	Phantom Flowage*	0	0	21	113	21	113
	Unnamed	0	0	1	25	1	25
	Webb Creek (east)	0	0	2	50	2	50
	Yellow River	2	15	1	0	3	15
<b>Subtotal</b>	<b>9</b>	<b>71</b>	<b>120</b>	<b>1316</b>	<b>129</b>	<b>1387</b>	
Chippewa	O'Neil Creek Flowage	0	0	2	10	2	10
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>10</b>	<b>2</b>	<b>10</b>
Douglas	Bear Lake	0	0	6	71	6	71
	Lower Ox Lake	0	0	4	3	4	3
	Minong Flowage	0	0	5	40	5	40
	Pokegama River/Bay	1	1	1	10	2	11
	Radigan Flowage	1	1	1	0	2	1
	St. Croix River	2	1	12	101	14	102
	St. Louis River	1	5	0	0	1	5
	St. Croix (Gordon) Flowage	2	12	3	9	5	21
	Upper Ox Lake	0	0	9	175	9	175
<b>Subtotal</b>	<b>7</b>	<b>20</b>	<b>41</b>	<b>409</b>	<b>48</b>	<b>429</b>	
Forest	Little Rice Lake	0	0	16	644	16	644
	Rat River	1	1	0	0	1	1
	Scott Lake	0	0	9	45	9	45
	Wabikon Lake	2	6	1	3	3	9
	<b>Subtotal</b>	<b>3</b>	<b>7</b>	<b>26</b>	<b>692</b>	<b>29</b>	<b>699</b>
Iron	Gile Flowage*	0	0	1	0	1	0
	Mud Lake*	0	0	1	5	1	5
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>5</b>

(Appendix 1 continued on the next page.)

Appendix 1 (cont.). Ricing trips and pounds of green manoomin harvested by respondents to the 2010 harvest survey. Seeded waters are marked by an asterisk.

COUNTY	WATER	TRIBAL		STATE		COMBINED	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Lincoln	Alice Lake	0	0	1	1	1	1
	Jersey City Flowage*	0	0	1	0	1	0
	Wisconsin River (at Alexander Lake)	0	0	1	25	1	25
	Wisconsin River (at Lt. Pine Creek Slough)	0	0	5	44	5	44
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>70</b>	<b>8</b>	<b>70</b>
Marquette	Harris Pond (Harrisville)	0	0	5	5	5	5
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>
Oneida	Big Lake	0	0	2	0	2	0
	Cuenin Lake	0	0	5	37	5	37
	Gary Lake	0	0	1	3	1	3
	Killarney Lake	0	0	1	8	1	8
	Sevenmile Lake*	0	0	4	50	4	50
	The Thoroughfare	0	0	7	15	7	15
	Wisconsin River	0	0	4	0	4	0
<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>24</b>	<b>113</b>	<b>24</b>	<b>113</b>	
Polk	Apple River	1	1	1	0	2	1
	Big Round Lake	0	0	1	0	1	0
	Joel Flowage*	0	0	10	1	10	1
	Rice Lake	0	0	4	57	4	57
	St Croix River	0	0	1	1	1	1
	White Ash Lake	0	0	1	0	1	0
	<b>Subtotal</b>	<b>1</b>	<b>1</b>	<b>18</b>	<b>59</b>	<b>19</b>	<b>60</b>
Price	Lower Steve Creek Flowage*	0	0	1	0	1	0
	Spring Creek WA Flowage*	0	0	3	0	3	0
	Wilson Flowage*	0	0	1	0	1	0
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>0</b>
Rusk	Lea Lake Flowage*	0	0	1	0	1	0
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>
Sawyer	Barker Lake	0	0	3	0	3	0
	Blaisdell Lake	0	0	1	0	1	0
	Hunter Lake	0	0	1	0	1	0
	Namekagon River	0	0	1	0	1	0
	Nelson Lake	1	7	0	0	1	7
	Pacwawong Lake	15	108	16	33	31	141
	Partridge Crop Lake	0	0	2	2	2	2
	Phipps Flowage	1	10	1	0	1	0
<b>Subtotal</b>	<b>17</b>	<b>125</b>	<b>25</b>	<b>35</b>	<b>41</b>	<b>150</b>	
Taylor	Chequamegon Waters Flowage*	0	0	7	1	7	1
	Mondeaux Flowage*	0	0	2	0	2	0
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>1</b>	<b>9</b>	<b>1</b>
Unnamed	Unnamed	0	0	1	2	1	2
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>

(Appendix 1 continued on the next page.)



Appendix 1 (cont.). Ricing trips and pounds of green manoomin harvested by respondents to the 2010 harvest survey.  
Seeded waters are marked by an asterisk.

COUNTY	WATER	TRIBAL		STATE		COMBINED	
		TRIPS	POUNDS	TRIPS	POUNDS	TRIPS	POUNDS
Vilas	Allequash Lake	0	0	7	12	7	12
	Aurora Lake	2	50	8	132	10	182
	Irving Lake	6	125	5	65	11	190
	Island Lake	5	55	17	267	22	322
	Lost Creek	0	0	5	20	5	20
	Lower Ninemile Lake	0	0	12	124	12	124
	Manitowish River	0	0	3	25	3	25
	Nixon Lake	0	0	14	140	14	140
	Partridge Lake	0	0	1	0	1	0
	Rest Lake	0	0	6	47	6	47
	Rice Creek	0	0	5	97	5	97
	Upper Ninemile Flowage	0	0	19	322	19	322
	West Plum Lake	0	0	7	32	7	32
	Wild Rice Lake	0	0	1	0	1	0
	<b>Subtotal</b>		<b>13</b>	<b>230</b>	<b>110</b>	<b>1283</b>	<b>123</b>
Washburn	Boyer Creek	0	0	1	7	1	7
	Dilly Lake	1	4	1	0	2	4
	Little Mud Lake	0	0	1	0	1	0
	Potato Lake	1	2	0	0	1	2
	Rocky Ridge Creek	0	0	1	0	1	0
	Tranus Lake	8	95	16	117	24	212
	Trego Flowage	1	0	6	0	7	0
	Unnamed	0	0	1	2	1	2
	Yellow River	0	0	1	1	1	1
	Yellow River Flowage	0	0	1	1	1	1
<b>Subtotal</b>		<b>11</b>	<b>101</b>	<b>29</b>	<b>128</b>	<b>40</b>	<b>229</b>
Waupaca	White Lake	0	0	1	1	1	1
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Waushara	Saxeville Pond	0	0	2	3	2	3
	<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>Grand Total</b>		<b>97</b>	<b>781</b>	<b>495</b>	<b>4939</b>	<b>592</b>	<b>5720</b>

**APPENDIX 2. Wisconsin manoomin harvest summary, 1992-2010**

NOTE: The tribal harvest estimate is off-reservation only; state harvest estimate is on and off reservation, although only a small amount is from on-reservation waters.

YEAR	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EST. TRIBAL HARV.	9850	13500	20429	36524	32543	41332	17868	14766	14925	17098	11713	27802	24285	9378	21930	30123	24055	26805	2032
EST. TRIBAL TRIPS	164	205	324	891	680	592	396	370	268	432	352	511	515	255	405	545	552	731	263
EST. STATE HARV.	23800	24000	43534	47164	50517	71741	28451	28310	27698	36668	32073	49358	57607	29041	62091	33120	50433	88008	10302
EST. STATE TRIPS	506	558	888	1091	1094	1246	954	971	881	1076	984	1453	1581	1324	1660	1316	1456	2135	1032
COMBINED TRIPS	670	763	1212	1982	1774	1838	1350	1341	1149	1508	1336	1964	2096	1579	2065	1861	2008	2866	1295
COMBINED HARV.	33650	37500	63963	83668	83160	113073	46319	43076	42623	53766	43786	77160	81872	38419	83921	63243	74488	114813	12334
COMB. OFF-REZ HARV	33650	37500	63963	83443	82949	113073	46161	42752	42333	52736	43542	76943	81633	38186	83771	63243	74247	114523	12334
COMB. OFF-REZ HARV	404	391	499	529	563	641	574	540	460	563	497	663	666	544	721	608	717	1040	558
% TRIBAL	0.29	0.36	0.32	0.44	0.39	0.37	0.39	0.34	0.35	0.32	0.27	0.36	0.30	0.24	0.26	0.48	0.32	0.23	0.16
# TRIBAL PERMITS	607	774	827	857	729	922	911	907	897	884	781	944	831	850	910	1248	1306	858	1019
EST. TRIBAL ACTIVE	162	186	122	171	213	176	158	140	116	139	104	96	86	72	116	101	153	197	95
% TRIBAL ACTIVE	0.27	0.24	0.15	0.2	0.29	0.19	0.17	0.15	0.14	0.16	0.13	0.1	0.1	0.08	0.13	0.08	0.12	0.23	0.09
TRIBAL AVE # TRIPS	1	1.1	2.7	5.2	3.2	3.4	2.5	2.6	2.3	3.1	3.4	5.3	6	3.5	3.5	5.4	3.6	3.7	2.8
TRIBAL LBS/TRIP	60	66	63	41	48	70	45	40	56	40	33	54	47	37	54	55	44	37	8
TRIBAL HARV/ACTIVE	61	73	167	214	153	235	113	105	129	123	113	290	282	130	188	298	157	136	21
# STATE PERMITS	285	225	405	402	388	508	488	467	396	488	432	621	665	585	659	605	651	914	611
EST. STATE ACTIVE	242	205	377	358	350	465	416	400	344	424	393	567	580	472	605	507	564	843	463
% STATE ACTIVE	0.85	0.91	0.93	0.89	0.9	0.92	0.85	0.86	0.87	0.87	0.91	0.91	0.87	0.81	0.92	0.84	0.87	0.92	0.76
STATE AVE # TRIPS	2.1	2.7	2.4	3	3.1	2.7	2.3	2.4	2.6	2.5	2.5	2.6	2.7	2.8	2.7	2.6	2.6	2.5	2.2
STATE LBS/TRIP	47	43	49	43	46	58	30	29	31	34	33	34	36	22	37	25	35	41	9
STATE HARV/ACTIVE	98	117	115	132	144	154	68	71	81	86	82	87	99	62	103	65	89	104	22
COMBINED # PER TRIP	50	49	53	42	47	62	34	32	37	36	33	39	39	24	41	34	37	40	10
NAMED SITES HARVESTED	35	50	53	65	71	68	66	76	65	74	71	92	94	110	89	98	102	102	70



Appendix 3. Waters suggested for seeding or restoration by respondents to the 2010 wild rice harvest survey.*	
COUNTY	WATER
Ashland	Black Lake Day Lake Fish Creek Sloughs (mentioned twice) Mineral Lake White River Flowage (Above HWY 112 dam)
Bayfield	Bono Creek Whittlesey Creek
Burnett	Clam Lake (historic bed in decline)
Douglas	Cranberry Flowage Mulligan Lake (historic bed in decline) St. Croix (Gordon) Flowage (historic bed in decline)
Forest	Peshtigo Lake
Oneida	Dog Lake (near St. Germaine) Rice Lake (near Three Lakes) Spur Lake (historic bed in decline) Shishebogama Lake Squirrel Lake
Vilas	Fence Lake Plum Lake
Washburn	Gilmore Lake (historic bed, possibly in decline) Spring Lake (historic bed in decline) Yellow River Flowage

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