WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

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George E. Meyer, Secretary
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October 12, 2000

Mr. Steven Jawetz
Beveridge & Diamond
Suite 700
1350 I Street, N.W.
Washington, D.C. 20005-3311

Dear Mr. Jawetz:

This is in response to your August 7, 2000 request for additional information regarding the Sheboygan River and Harbor Superfund Site. I am enclosing our responses for Item No 1, 3, and 6. Information for Item 2, Mudpuppy Study, is still being gathered and will be sent to you as soon as possible. The Department (see Todd Peterson memo) has not collected the snapping turtle information requested in Item 4. There seems to be some confusion as to what you are requesting in Item 7. Could you be more specific as to which fish collections you are referring to? It is our belief that Blasland Bouck and Lee is in possession of the creel survey data requested in Item 9. Mr. Brad Eggold had provided this information in the past in response to various requests made by Blasland Bouck and Lee.

Please contact me at 414-229-0853 if you have any questions or care to discuss this matter.

Sincerely,

Thomas A. Wentland
Waste Management Engineer
Remediation and Redevelopment Team

Cc/ File FID No.

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State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary

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TO: Tom Wentland, SER

From: Todd Peterson, PSU Section Chief

Tom:

Please find the enclosed information regarding the Aug. 7, 2000 letter from Mr. Steven Jawetz requesting additional information on the Sheboygan River and Harbor. Please forward this memo and information to Mr. Jawetz.

Tree Swallow Study
Enclosed you will find field notes and observations and raw PCB analysis data from our 1996-97 collection. To date, no final reports on this study have been generated by the WDNR.
Key to nest locations:
ML = private property on Meadowlark Road bordering Sheboygan River above Sheboygan Falls
TT = public land on County Road TT bordering Sheboygan River above Sheboygan Falls
RW = Kohler's River Wildlife Sanctuary between Sheboygan River and golf course
IA = Island within Sheboygan River off of New Jersey Ave west of the New Jersey Ave. bridge
KA = powerline right-of-way adjacent to Kohler landfill along County Road A

WDNR retains all rights to the use of the data provided. **Under no circumstance shall the data provided be used in any publications, analysis, or other public use without consent of the Department.**

Mudpuppy Study
This information is still being gathered and will be sent to you as soon as completed.

Small Mammal Study
Enclosed you will find field notes and observations and raw PCB analysis data from our 1996-97 collection. To date, no final reports on this study have been generated by the WDNR. Refer to the location key listed under Tree Swallow Study for locations of trapping. Plant material analysis was not possible due to validation of extraction procedures.

WDNR retains all rights to the use of the data provided. **Under no circumstance shall the data provided be used in any publications, analysis, or other public use without consent of the Department.**

Snapping Turtle Study
Recapture efforts have not yet been conducted. Techniques and workload for recapturing microchipped juvenile turtles are still being worked out.

TREE SWALLOW NESTING SUMMARY
1996

(IA)
(KA)

Box No.	TOTAL E	No. Y Hatched (H)	No Y Banded (B)	Material Collected	Notes
KA9	5E	4	2	* 1DY 6/9, * 12DY 6/20	
IA1	6E	4	2	* 1DY 6/15, * 12DY 6/26	
IA3	6E	4	0	* 1DY 6/11	Nest flooded out 6/17
IA5	4E } 6 total	0	0	—	Eggs gone (vandalism) ↓ RECLUTCHED ↓
IA5	4E }	2	1	* 12DY 7/9	
IA7	3E	0	0	* 3E 6/13	abandoned
IA8	5E	0	0	—	Flooded out 6/22
IA9	4E	0	0	* 2E 6/20	Flooded out 6/17
IA10	5E	4Y	2	* 1E 6/2 * 2DY, 6/4, * 11DY 6/14	
IA2b	4E	3Y	2	* (12) DY 7/23	discrepency in Proj (H) date probably due to unknown gap in laying sequence.

1996 PHENOLOGY CHART - TREE SWALLOWS

BOX NO.	1st E Date	Last E Date	TOTAL E	Projected (H) Dates	Actual (H)	1DY Date	1DY wt. D1	12DY wt. D1	12DY wt-D6 Date	12DY wt-D12 Date	NOTES
IA1	05/25	05/30	6E	06/11-06/13	6/14	6/15*	2.5g	2.6g	06/20 17.0	06/26 28.0g	* 1DY 6/15, *12DY 6/26
IA3	05/20	05/25	6E	06/06-06/08	06/10	06/11*	2.8g	2.9g	06/17 DAY 7 —	06/22 —	Nest box washed out by river 06/17 * 1DY 6/11
IA5	05/15	05/21	7E	06/02-06/04	—	—	—	—	—	—	Nest gone 05/28 Vandalism ↓ RECLUTCHED
IA5	06/08	06/11	4E	06/23-06/25	C/27	6/28	ADY 7/011 11.0g	C:0g	(DSY) 14g 7/2	*12DY 23g 7/9	6/30 2Y 11g 6g, 7/2 14a 7/9 2Y 23g *1E 7/1, *12DY, 7/9
IA7	05/27	05/31	3E	06/12-06/14	—	—	—	—	—	—	Abandoned, Gap in laying Sequence * 3E 6/13
IA8	06/04	06/08	5E	06/20-06/22	—	—	—	—	—	—	Nest box gone due to high water 6/22 No Samples
IA9	06/04	06/07	4E	06/19-06/21	—	—	—	—	—	—	Nest box washed out by river 06/17 *2E 6/20
IA10	05/12	05/17	5E	05/29-05/31	06/02	06/03	06/04 * 2DY-3.0g	—	06/08 5.9g	06/13 *11DY-15g	* 1DY 6/3, *11DY 6/13
IA2b	07/01	07/04	4E	07/16-07/18	(07/11)	(07/11)	—	—	(12D) 7/17 16.0g	(12D) 7/23 25g	7/2 2E, 7/9 4E, 7/17 3Y-6D *(12) DY 7/23
KA9	05/21	05/25	5E	06/06-06/08	06/08	06/09*	2.2g	2.9g	06/14 12.5g	06/20 *21.5g	06/20 2Y(B) 36023 36025 * 1DY 6/9, *12DY 6/20

TREE SWALLOW NESTING SUMMARY
1996

Control Areas (TT) (ML)

Box No.	TOTAL E	(H) No. Y Hatched	(B) No Y Banded	Material Collected	Notes
TT1	5E	3Y	(1)	*1E, *2DY, 6/18	*1fDY 7/1
TT3	5E	0Y	0 Y	*5E 6/7	nest abandoned
TT4	4E	0Y	0	*4E 6/7	nest abandoned
TT7	5E	4Y	2	*1E, *1DY, 6/18, *15DY 7/1	
ML8	5E	4Y	2	*1E, *1DY, 6/14, *12DY 6/25	
ML11	4E	0Y	0	*4E 6/18	unhatched and overdue, abandoned
ML13	4E	4Y	2	*1DY 6/14	young gone nest empty 6/25 (predator)
ML16	5E } 10 Total	0	0	—	5E gone after 5/29 ↓RECLUTCHED↓
ML16	5E }	0	0	*5E 6/26	unhatched and Overdue (nest abandoned
ML18	5E	3Y	1	*2E, *1DY, 6/11, *12DY	
ML20	4E	0	0	*1E 6/6, *2E 6/12 ×1E	Nest damaged by house sparrows then abandoned

1996

PHENOLOGY CHART - TREE SWALLOWS

BOX NO.	1st E Date	Last E Date	TOTAL E	Projected (H) Dates	Actual (H)	1DY Date	1DY Wt. D1 #3 4.1g	12DY Wt. D1 6 hatched	12DY Wt-D6 Date	12DY Wt-D12 Date	NOTES
TT1	05/29	06/02	5E	06/14-06/16	06/16	06/17	06/18 2DY 3.25g	06/18 2DY 3.90g	5DY/6/2 11.5g	6/28	8DY 20.5g 6/24 *1E, 2DY 6/18,
TT3	05/19	05/23	5E	06/04-06/06	—	—	—	—	—	—	Nest, abandoned *5E 6/7
TT4	05/19	05/22	4E	06/03-06/05	—	—	—	—	—	—	Nest abandoned *4E 6/7
TT7	05/31	06/04	5E	06/16-06/18	06/17	06/18	06/18 1DY 1.8g	06/18 1DY 2.0g	06/23	06/29	6/21 7.0g 6/24 15.0g *1E, 1DY 6/18, *1 5DY 7/1
ML8	05/25	05/29	5E	06/10-06/12	06/13	06/14	3.7g	3.4g	06/19 16.0	06/25 26.0g	*1E *1DY 6/14, *12DY 6/25
ML11	05/28	05/31	4E	06/12-06/14	—	—	—	—	—	—	Nest abandoned *4E 06/18 Unhatched & Overdue
ML13	05/26	05/30	5E	06/11-06/13	06/13	06/14	2.8g	2.7g	06/19 13.0g	06/25 —	all young gone, nest empty 06/25/96
ML16	05/21	05/25	5E	06/06-06/08	—	—	—	—	—	—	All E disappeared after 05/29 RECLUTCHED
ML16	06/04	06/08	5E	06/20-06/22	—	—	—	—	—	—	*5E 6/26 Unhatched and overdue nest abandoned
ML18	05/22	05/26	5E	06/07-06/09	06/10	06/11	1.9g	2.8g	06/16 15.5g	14DY/6/22 26.5g	*2E *1DY 6/11,
ML20	06/02	06/05	(4E	06/17-06/19	—	—	—	—	—	—	Nest damaged by H.S. then abandoned *1E 06/06 *2E 06/12

TREE SWALLOW NESTING SUMMARY
1996

(RW)

	TOTAL E	No. Y Hatched (H)	No. Y Banded (B)	Material Collected *	Notes
RW4	4E	1Y	0	*12DY 6/25	Single young, no other material collected
RW7	3E	0Y	0	*1E 6/8	Abandoned nest
RW8	3E	2Y	0	*1E *2-1DY 6/17	Adult killed by predator, feathers on box) 2 young and 1 egg X (Cold)
RW9	4E + 4E 8E	0Y	0	*8E 6/25	Reclutched rapidly unexpected all 8E abandoned.
RW11b	(2+2) 4E	2Y	0	(cracked by H.S.) *2E 6/6, *1DY 6/26, 1st 2E *14DY 7/9	
RW12	7E	6Y	3-2(x) (1)	*1E *1DY 6/6, *2-14DY 6/19 *13DY 6/18, *2-14DY x (wet) 6/19, 1Y gone 6/1	
RW13	4E	2Y	0	*2E, *1DY, 6/15, (*)1Y x (wet 6/21) 6/25	
RW14	3E	0Y	0	*3E 6/18 unhatched and overdue (Adults tendi	
RW15	6E	5Y	3	*1DY 6/10, *12DY 6/21 1E gone 6/8	
RW16	7E 1EX	4Y	2	*2E 6/8, *2DY 6/10, *12DY 6/20	
RW17	5E	4Y	2	*1E 6/6, *1DY 6/7, *12DY 6/18	

1996 PHENOLOGY CHART - TREE SWALLOWS

BOX NO.	1st E Date	Last E Date	TOTAL E	Projected (H) Dates	Actual (H)	1DY Date	1DY Wt. D1	12DY Wt. D1	12DY Wt-D6 Date	12DY Wt-D12 Date	NOTES
RW4	05/27	05/30	4E	06/11 - 06/13	06/13	06/14	2.2g	1.9g	6/21/8DY 16.0g	06/25 * 20.5g	E apparently not collected * 12DY 6/25
RW7	(05/21)	(05/24)	3E	06/05 - 06/07	—	—	—	—	—	—	Abandoned nest * 1E 6/8
RW8	05/27	05/29	3E	06/10 - 06/12	06/16	06/17 *2whole Carcasses, Not weighed X	—	—	—	—	*1E *2Y 6/17 adult killed by predator, (feathers smeared on box)
↓RW9	05/18	05/21 05/22	4E	06/02 - 06/04 06/03 - 06/05	—	—	—	—	—	—	↓RECLUTCHED↓ unexpectedly with 4 eggs in nest
RW11B	06/05	06/08 06/12	4E (2+2)	06/20 - 06/22 06/24 - 06/26	06/25	06/26 *	3.2g	3.2g	07/01 15.0g	07/09 * 14DY 22g	5 Cracked by H.S *2E 6/6, *1DY 6/26, *14DY 7/9
RW12	05/17	05/23	7E	06/04 - 06/06	06/05	06/06 *	06,06 1.95g	06/06 2.1g	06/11 18.0g	06/17 20.0g	*2- 14DY (x) 6/19, 1 Young gone 6/10 *1E, *1DY 6/6, *13DY 6/13
RW13	05/24	05/27	4E	06/08 - 06/10	06/14	06/15	06/15 3.1g	06/15 3.1g	06/20 15.0g	06/26 —	*2E, *1DY, 6/15 (*)1YX 6/25
RW14	05/23	05/25	3E	06/06 - 06/08	—	—	—	—	—	—	*3E 6/18 Parents still tending
RW15	05/20	05/25	6E	06/06 - 06/08	06/09	06/10	06/10 2.9g	06/10 2.8g	06/15 13.3g	06/21 23.0g	1E gone 6/8 *1DY 6/10 *12DY 6/21
RW16	05/20	05/26	7E (1EX)	06/07 - 06/09	06/08	06/09	06/10 2DY 3.8g	06/10 2DY 3.2g	06/14 12.1g	06/20 24.0g	*2E 6/8, *2DY 6/10 *12DY 6/20
RW17	05/18	05/22	5E	06/03 - 06/05	06/06	06/07	06/07 2.1g	06/07 2.3	06/14 8DY 18.2g	06/18 12D 22.0g	
RW9	06/06	06/09	4E (8E, in nest)	06/21 - 06/23	—	—	—	—	—	—	birds double clutched unexpectedly 4E+4E. Abandoned *8E 06/25

KA

Total trap days 280 V: 191 S: 62
DM: 31(18R) MJM: 6 MV: 2 B: 10
CHP: 12(8R) SOR: *2 STS: *2 Bad Fly: 2

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

Set 08/21

1st Set

LOCATION: KA 08/22 | 2 KA 08/23 | KA 08/24

1	✓	✓	1	DM(R) (01)	CHP*	1	✓	✓
2	✓	✓	2	CHP (tail injured)	DM(R)	2	✓	CHP(R)
3	S	13	3	✓	DM*	3	DM(R)	CHP(R)
4	✓	DM (lactating ♀) (01)	4	✓	✓	4	DM(R)	SOR* (alive)
5	✓	✓	5	✓	✓	5	✓	*✓ (alive)
6	✓	✓	6	✓	✓	6	✓	PM(m)
7	✓	✓	7	S	S(coon)	7	✓	✓
8	✓	✓	8	S	S	8	✓	✓
9	✓	PM*	9	S	S	9	✓	✓
10	✓	✓	10	✓	✓	10	✓	DM(f preg)
11	✓	✓	11	S	S	11	✓	✓
12	✓	✓	12	S	S	12	✓	DM
13	✓	✓	13	S	S	13	✓	✓
14	✓	✓	14	S	S	14	DM(jf)	✓
15	✓	✓	15	S	S	15	DM(jm)	✓

TOTAL TRAP ~~HOURS~~ DAYS: 90

raccoon interference ½ put in Cages

added 3 stations (6 traps) D1, D2, P3 along ditch

Bait = 0
Fly

S = 17
✓ = 57

TOTAL CAPTURES BY SPECIES:

DM: 11(3R) MJM: 0 MV: 0 CHP: 3(1R) SOR: *1 STS: 0

OTHER: _____ NOTES: _____

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

LOCATION: KA 08/25 | KA 08/29 EVE | KA 08/30

D1	MJM*	✓	D1	✓	✓	D1	✓	✓
D2	CHP(R)	✓	D2	✓	CHP*	D2	✓	DM
D3	✓	✓	D3	✓	CHP(m)	D3	MJM (escaped)	✓
1	DM(R)(f)	two infants in trap ✓	1	—	S	1	MJM	✓
2	CHP(R)	✓	2	✓	✓	2	S	✓
3	✓	✓	3	✓	S	3	✓	S
4	✓	✓	4	✓	CHP(R)	4	✓	DM(R)
5	✓	DM(R)(f)	5	✓	DM(R)	5	✓	S
6	S	B	6	✓	✓	6	✓	MJM
7	✓	✓	7	✓	✓	7	DM(R)	✓
8	DM(R)	SOR*	8	✓	✓	8	DM	✓
9	DM(R)	✓	9	✓	✓	9	MJM	MV
10	✓	✓	10	✓	DM(R)	10	DM(R)	✓
11	✓	DM(R)	11	DM(R)	DM(R)	11	✓	✓
12	MV*	✓	12	✓	✓	12	MJM	DMR
13	DM(R)	✓	13	DM	DM(R)	13	✓	✓
14	✓	✓	14	S	✓	14	S	✓
15	DM(m)	✓	15	✓	DM(R)	15	✓	B

B = 2
S = 6
✓ = 63 ✓
Bait = 0

TOTAL TRAP ~~HOURS~~ DAYS: 89

TOTAL CAPTURES BY SPECIES:

DM: 20 (16R) MJM: 5 (1*) MV: 2 (1*) CHP: 5 (3R 1*) SOR: 1* STS: 0

OTHER: _____ NOTES: Two infant DM in trap 8/25 left open for escape E & young

KA

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

n = new capture, not marked

LOCATION: KA 08/31/95 | KA 09/01 | KA 9/21

D1	✓	✓	D1	✓	MJM *	D1	DM(R)	STS *
D2	DM(R)	✓	D2	B	✓	D2	✓	SOR *
D3	✓	S	D3	CHP(R)	✓	D3	✓	DM(R)
1	DM(R) (Bot Fly)	✓	1	✓	DM(R) Bot Fly	1	✓	STS *
2	✓	✓	2	✓	✓	2	✓	✓
3	✓	CHP (escaped out mx)	3	✓	✓	3	✓	DM(R)
4	DM(R)	✓	4	✓	✓	4	✓	✓
5	✓	✓	5	✓	DM(R)	5	✓	DM(R)
6	✓	✓	6	✓	✓	6	✓	MV *
7	✓	✓	7	✓	✓	7	✓	✓
8	S	✓	8	✓	CHP(n)	8	✓	✓
9	✓	✓	9	✓	MJM *	9	✓	CHP(m)
10	DM(R)	✓	10	✓	✓	10	✓	DM(?)
11	STS *	✓	11	✓	✓	11	✓	DM(R)
12	✓	✓	12	✓	DM(R)	12	✓	MJM(n)
13	✓	✓	13	B	✓	13	S	MJM(m)
14	✓	✓	14	✓	✓	14	✓	DM(R) Preg - Box
15	✓	✓	15	DM (Bot fly on mack)	✓	15	✓	DM(R)

✓ = 74
S = 3
B = 2

Bot Fly = 3 (2R)

TOTAL TRAP ~~HOURS~~ DAYS: 90 * Cages removed raccoons subsided

TOTAL CAPTURES BY SPECIES:

DM: 16 (15R) MJM: 4 (*2) MV: 1 MV (*1) CHP: 4 (1R) SOR: 1 (1*) STS: 2 (2*)

OTHER: _____ NOTES: _____

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

(X) = Lable X = Dead

LOCATION: KA 09/22/95 | 09/26 | 09/27

D1	✓	✓	D1	✓	✓	D1	✓	✓
D2	✓	DM(R)	D2	B	✓	D2	✓	✓
D3	✓	✓	D3	✓	✓	D3	✓	✓
1	CHP(R)	DM(R)	1	B	✓	1	DM(R)	✓
2	✓	DM(R)	2	MJM	DM(R)	2	DM(R)	CHP(R) (stub tail)
3	✓	✓	3	STS*	✓	3	MJM(tw)	✓
4	S	S	4	DM(R)	✓	4	S	S
5	✓	✓	5	✓	✓	5	S	S
6	S	S	6	MV(st)	✓	6	S	S
7	B	S	7	✓	✓	7	S	S
8	DM(R)	MJM(m)	8	✓	✓	9	B	B
9	✓	✓	9	✓	✓	9	S	S
10	S	S	10	DM(R)	✓	10	S	S
11	✓	DM(R)	11	✓	✓	11	✓	MV(m)
12	✓	B	12	MV(m)	MV(m)	12	✓	✓
13	S	S	13	DM(R)	MJM(m)	13	✓	MV(R)
14	S	S	14	✓	✓	14	S	S
15	S	S	15	✓	✓	15	S	S

✓ = 50
S = 29
B = 6
Dead = 0

TOTAL TRAP ~~HOURS~~ DAYS: 90

TOTAL CAPTURES BY SPECIES:

DM: 11 (11R) MJM: 4 (3R) MV: 5 (1R) CHP: 2 (2R) SOR: 0 STS: 1 *

OTHER: _____ NOTES: Considerable raccoon interference S = 29

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. ✓= trap checked, * = Specimen collected (otherwise marked and released), m= marked, n= not marked, (-) = not set or no data. x = dead (x) = feeble j = juvenile

LOCATION: KA, Sheboygan river, Kohler

DATE: 09/28/95 NOTES: 3-15 move ~10m inland to avoid raccoon interference			DATE: 09/29/95 NOTES:			DATE: 10/03 NOTES: Rainy ~ 1 day increased STS activity		
D1	✓	✓	D1	CHP R	✓	D1	✓	STS*
D2	✓	✓	D1	✓	✓	D2	✓	B
D3	✓	✓	D3	S	S	D3	✓	✓
1	✓	DMR	1	✓	DMR	1	S	✓
2	DMR	DMR	2	S	S	2	✓	PMR
3	S	S	3	S	S	3	✓	S
4	✓	✓	4	S	S	4	MV(n)	B
5	✓	✓	5	B	✓	5	✓	✓
6	✓	CHP R	6	✓	B	6	MV X	DM(n)
7	MV(m)	✓	7	✓	MV(m)	7	MV	✓
8	✓	✓	8	✓	B	8	MV	DM; X
9	✓	✓	9	S	B	9	✓	*STS
10	✓	MV(m)	10	S	B	10	✓	✓
11	S	S	11	S	S	11	DM; X	STS*
12	S	S	12	S	MV Juv (m)	12	✓	✓
13	DMR(X)	✓	13	S	S	13	✓	✓
14	✓	B	14	MV(x)	S	14	✓	✓
15	–	DMR	15	–	STS*	15	✓	DMR

✓ = 49
S = 24
B = 8
Bad Trap = 0

TOTAL TRAP DAYS: 88

TOTAL CAPTURES BY SPECIES:

DM: 11 (3X 9R) MJM: 0 MV: 9 (2x) CHP: 2 (2R) SOR: 0 STS: *4

OTHER: _____ NOTES:

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected (otherwise marked and released), m= marked, n= not marked, (-) = not set or no data.

LOCATION: KA. Sheboygan River Kohler

DATE: 10/04/95 ✓ NOTES: MV, Successfully Marked with black dye	DATE: 10/05/95 Th NOTES: last time Set & checked	DATE: NOTES:

D1	B	STS*	D1	✓	CHP R			
D2	✓	✓	D2	✓	S			
D3	✓	STS*	D3	✓	✓			
1	✓	✓	1	✓	B			
2	✓	DMR (Bo1 Sm)	2	S	S			
3	✓	✓	3	✓	✓			
A	✓	MVX	A	B	S			
5	✓	B	5	✓	B			
6	MV (large)	✓	6	S	S			
7	CHP (n)	✓	7	S	✓			
8	MVR←	✓	8	S	S			
9	✓	STS(s)* X	9	S	B			
10	✓	DM j (n)	10	S	S			
11	(SOR)*	DM(j) X	11	S	B			
12	✓	✓	12	-	-			
13	✓	✓	13	-	-			
14	✓	✓	14	-	-			
15	✓	✓	15	-	-			

✓ = 32
S = 12
B = 7
Bo1 = 1 R
Sm

Trapline closed 10/05/95

TOTAL TRAP DAYS: 58 TOTAL CAPTURES BY SPECIES:

DM: 3 (1R) MJM: 0 MV: 3 (1R 1X) CHP: 1 (1R) SOR: 1* STS: 3*

OTHER: NOTES:

Total trap days: 331 ✓: 162 S: 69 B: 8
DM: 78 (42R 4x) MJM: 0 MV: 0 CHP: 2 (1x)
SOR: *2 STS: *4 Bot fly: 11 (3R 1x)

RW

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, ~~(otherwise marked and released)~~.

* Traps all enclosed

m = marked new capture n= not marked escape etc.

LOCATION: RW 09/01/95 | RW 09/21 | RW 09/22

RV 1	S	S	1	✓	✓	1	✓	✓	✓ (3 sets)
2	S	S	2	✓	✓	2	✓	✓	
3	B	S	3	✓	✓	3	✓	✓	
4	✓	DM	4	✓	✓	4	-	-	
5	S	S	5	DM(m)	DM(R) Bot x2	5	✓	✓	
6	DM	✓	6	—	✓	6	✓	-	
7	DM	✓	7	S	✓	7	✓	✓	
8	S	S	8	S	DM(R)	8	✓	✓	
9	✓	DM(n)	9	✓	S	9	SOR*	STS*	
10	✓	DM(n)	10	DM(m)	DM(m) Bot fly	10	✓	✓	
11	✓	✓	11	✓	✓	11	✓	✓	
12	✓	DM(m)	12	✓	DM(n)	12	DM(R)	DM (m)	
13	S	S	13	✓	S	13	✓	CHP (m)	
14	✓ (marked on hind)	DM (Bot fly)	14	✓	DM(m)	14	DM(R)	DM ~~X~~ Bot fly on chuck	
15	S	S	15	DM(m)	DM(m)	15	✓	DM (m)	
	Not due to interference	Line reset raccoon							

✓: 15
S: 17
B: 1
Bot fly: 5 (1x2)
STS*

TOTAL TRAP ~~HOURS~~ DAYS: 91

TOTAL CAPTURES BY SPECIES:

DM: 21 (3R) MJM: 0 MV: 0 CHP: 1 SOR: *1 STS: *1

OTHER: _____ NOTES: _____

RW

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

LOCATION: RW 09/26			RW 09/27			RW 09/28		
1	✓	DM (m)	1	✓	DM(R)	1	1	DM(R)
2	✓	DM(m) Bot Esc	2	DMR(x)	DM(m)	2	—	✓
3	✓	✓	3	S	✓	3	✓	S
4	✓	✓	4	S	—	4	DM(R)	✓
5	—	✓	5	✓	DM(R)	5	✓	—
6	✓	✓	6	✓	DM(R)	6	✓	DM(R)
7	✓	DMR(m)	7	✓	—	7	✓	DM(R)
8	✓	—	8	S	S	8	✓	B
9	B	✓	9	S	S	9	✓	DM(m)
10	✓	✓	10	✓	DMR(m)	10	✓	DM(R)
11	✓	✓	11	✓	✓	11	✓	DM(R) (X)
12	✓	✓	12	S	S	12	✓	S
13	DM(R)	✓	13	✓	DM(R)	13	S	S
14	DMR(m)	DM(R)	14	✓	✓	14	S	S
15	✓	S	15	—	S	15	S	S
16	DM(R)(m)	DM (m) esc	16	S	S	16	S	S
17	S	S	17	CHP(x)	S	17	S	S
18	S	S	18	S	S	18	S	S

Bot Esq (escaped)

Bot Esq x2 healthy!

TOTAL TRAP ~~HOURS~~ DAYS: 10 | V: 12 S: 33 B: 2

Bot Esq: 4 (1R 1X 2)

TOTAL CAPTURES BY SPECIES:

DM: 22 (15 R 1X) MJM: 0 MV: 0 CHP: 1X SOR: 0 STS: 0

OTHER: _____ NOTES: _____

(RW)

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew, TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected (otherwise marked and released), m= marked, n= not marked, (-) = not set or no data.

LOCATION: River Wildlife, Kohler Sheboygan River, WI

DATE: 09/29/95 NOTES:			DATE: 10/03 NOTES:			DATE: 10/04 NOTES:		
1	✓	✓	1	B	B	1	B	B
2	✓	DM(m) Bot fly	2	B	DM R	2	✓	DM (n)
3	✓	✓	3	✓	DM (n)	3	✓	✓
4	✓	✓	4	–	(rose)	4	S	–
5	✓	✓	5	✓	✓	5	DM R	DM R -
6	✓	DM R	6	✓	DM R X	6	✓	–
7	S	✓	7	✓	DM (n)	7	✓	✓
8	✓	S	8	–	DM R	8	✓	✓
9	*STS	*STS	9	S	✓	9	DM R	✓
10	✓	✓	10	S	✓	10	DM R	DM (n)
11	DM R	DM R	11	✓	DM R	11	✓	DM R -
12	✓	✓	12	✓	DM R (wound on hind)	12	✓	DM (n)
13	S	✓	13	DM(n)	DM R	13	–	✓
14	–	S	14	✓	DM R	14	✓	✓
15	S	S	15	✓	DMR(x)	15	✓	✓
16	–	–	16	–	–	16	–	–
17	–	–	17	–	–	17	–	–
18	–	–	18	–	–	18	–	–

Bot fly (no hole. Scum)

(leg wound o.k.)

✓ : 43

S : 9

B : 5

Bot fly : 2

TOTAL TRAP DAYS: 83 TOTAL CAPTURES BY SPECIES: * 2 STS's

DM: 23 (15 R 2x) MJM: 0 MV: 0 CHP: 0 SOR: 0 STS: *2

OTHER: _____ NOTES:

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected (otherwise marked and released), m= marked, n= not marked, (-) = not set or no data.

LOCATION: River Wildlife (lodge) Kohler Sheb. River Wi

DATE: 10/05/95 NOTES:			DATE: 10/06/95 NOTES: Last time Checked 1995			DATE: NOTES:		
RW1	✓	✓	1	✓	DM (n)			
2	✓	DMR X	2	✓	-			
3	✓	✓	3	✓	S			
4	-	S	4	DMR	✓			
5	✓	✓	5	✓	✓			
6	DMR	✓	6	✓	S			
7	-	✓	7	✓	STS *			
8	S	✓	8	S	✓			
9	DM (n)	SOR *	9	✓	S			
10	✓	✓	10	✓	DM (n)			
11	✓	✓	11	✓	✓			
12	DMR	DMR	12	DMR	DMR			
13	DMR	DMR (Log Box)	13	S	✓			
14	✓	✓	14	S	S			
15	✓	✓	15	S	-			

✓: 32
S: 10
13: 0
Bait: 0

TOTAL TRAP DAYS: 56 TOTAL CAPTURES BY SPECIES:

DM: 12 (9R 1X) MJM: 0 MV: 0 CHP: 0 SOR: 1* STS: 1*

OTHER: NOTES:

TT

TRAP DATA

07/25/95 - 08/30/95
Total trap Days = 280
Total Captures
DM: 31 (18R)
MJM: 6
MV: 2
SOR: 2
STS: 2
CHP: 12 (8R)

✓ =
S =
B =
Bot fly =

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew,
TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released)

j = juvenile f = female m = male X = dead

DATE/
LOCATION: TT 07/25/95 | TT 07/26 | TT 08/22

E1	✓	DM (01) (tagging)	E1	✓	DM (m) (06)	E1	✓	PM(R)
2	✓	✓	2	✓	✓	2	✓	MJM*
3	✓	(07) DM lesions on ears	3	✓	*CHP (m)	3	DM (07)	DM X (Bot fly larvae)
4	✓	DM (j) (03)	4	✓	*SOR	4	✓	✓
5	✓	✓	5	✓	✓	5	✓	✓
6	✓	✓	6	✓	✓	6	✓	✓
7	✓	✓	7	✓	✓	7	✓	✓
W1	✓	✓	W1	✓	✓	1	✓	✓
2	✓	✓	2	✓	✓	2	✓	✓
3	✓	✓	3	✓	✓	3	✓	CHP
4	✓	✓	4	✓	✓	4	✓	✓
5	✓	✓	5	✓	✓	5	✓	✓
6	✓	S	6	✓	✓	6	✓	✓
7	✓	✓	7	✓	*CHP	7	✓	DM (not marked)
8	✓	S	8	✓	✓	8	✓	✓
9	✓	DM (jf) (01)	9	✓	✓	9	✓	CHP(R)
10	✓	Dm (m) (05)	10	✓	*CHP	10	S	CHP(R)
		↘		↘				
		34 days			31 days			↘ 31 days

✓ = 30
S = 1
B = 0
Bot fly = 1

TOTAL TRAP ~~HOURS~~ DAYS: 102 (PAGE) = 34

TOTAL CAPTURES BY SPECIES: /RECAPS

DM: 10 : (1R) MJM: 1 MV: 0 CHP: 6 (2R) SOR: 1 STS: 0

OTHER: _____ NOTES: initial marking for individuals soon abandoned 3*

* 6 funnel traps were deployed along existing sections of Silt Fence. These were not effective at Capturing target species.

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew, TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

LOCATION: TT 08/23			TT 8/24(EVE)			TT 08/25		
E1	DM(R)	S	E1	✓	✓	E1	✓	✓
2	✓	✓	2	✓	✓	2	✓	✓
3	✓	S	3	✓	✓	3	✓	DM(R)(jm)
4	✓	✓	4	✓	✓	4	S	✓
5	✓	✓	5	DM(m)	✓	5	B	✓
6	✓	✓	6	✓	✓	6	✓	✓
7	✓	✓	7	✓	✓	7	✓	DM(R)
			8 Sz1	–	–	8	B	B
W1	✓	DM(R)	W1	✓	S			
2	✓	S	2	✓	✓	1	B	B
3	✓	✓	3	✓	✓	2	✓	SOR*
4	✓	✓	4	✓	✓	3	✓	✓
5	DM(jm)	✓	5	S	✓	4	B	✓
6	✓	CHP(R)(f)	6	✓	✓	5	B	B
7	✓	✓	7	CHP(R)(f)	✓	6	B	DM(R)(jm)
8	✓	✓	8	DM(R)(jm)	✓	7	B	CHP(R)(f)
9	S	DM(jm)	9	DM(jm)	✓	8	✓	✓
10	DM(R)(f)	✓	10	CHP(R)(m)	✓	9	DM(R)(jm)	✓
		↘				10	DM(R)	✓
		34 days			✗ 36 days			36 days

✓ = 67
S = 7
B = 10
Bait DM = 5

- black rump

TOTAL TRAP ~~HOURS~~ DAYS: 106 (This page)

added 1 station E

TOTAL CAPTURES BY SPECIES:

DM: 14 (10R) MJM: 0 MV: 0 CHP: 3 (3R) SOR: 1 STS: 0

OTHER: _____ NOTES: _____

TRAP DATA

SPECIES CODES: DM= Deer mouse, MJM= Meadow jumping mouse, MV= Meadow vole, E.CHP= Eastern chipmunk, SOR= Sorex shrew, STS= Short-tailed shrew, TRAP CODES: R= recapture, S= trap sprung, no capture, B= bait raided, no capture. X= trap checked, * = Specimen collected, (otherwise marked and released).

LOCATION: TT 08/29/95 | TT 08/30

1W	✓	STS*	W1	✓	✓			
2	MJM(2)*	MJM(3)*	2	✓	✓			
3	MJM*	✓	3	✓	MV(n)			
4	✓	MV*	4	✓	✓			
5	✓	S	5	✓	✓			
6	✓	✓	6	MJM	✓			
7	S	✓	7	✓	✓			
8	✓	CHP(R)	8	S	✓			
9	DM(R)	DM(R)	9	S	✓			
10	DM(R)	CHP(R) (same trap 1st pitfall)	10	S	S			
E1	DM(R)	✓	1	✓	S			
2	STS*	DM(R) B/C	2	✓	S			
3	✓	CHP(R)	3	DM(R)	DM(R)			
4	✓	S	4	✓	✓			
5	✓	✓	5	S	✓			
6	✓	✓	6	✓	✓			
7	✓	✓	7	✓	✓			
8	✓	S	8	MJM	✓			

✓ = 12
S = 11
B = 0
B/C = 1
STS = 2

TOTAL TRAP ~~HOURS~~ DAYS: 72 * pulled trap 1 ac 08/30

TOTAL CAPTURES BY SPECIES:

DM: 7(7R) MJM: 5 (3*) MV: 2 CHP: 3(3R) SOR: 0 STS: 2

OTHER: _____ NOTES: _____

SPECIES	DNR ID	ORG ID	SUBMITTOF	DATE	DISTRICT	COUNTY	TWSPRNG	LOCATION	INORG ID	AGE	SEX
SOREX	96001	OG002170	SED	100195	0	60		15N,23E,29, COUNTY A			
ZAPUS	96006	OG002171	SED	82595	0	60		15N,23E,29, COUNTY A			
ZAPUS	96007	OG002172	SED	90195	0	60		15N,23E,29, COUNTY A			
ZAPUS	96008	OG002173	SED	90195	0	60		15N,23E,29, COUNTY A			
BLARINA	96009	OG002174	SED	100395	0	60		15N,23E,29, COUNTY A			
BLARINA	96011	OG002175	SED	100395	0	60		15N,23E,29, COUNTY A			
BLARINA	96014	OG002176	SED	100495	0	60		15N,23E,29, COUNTY A			
BLARINA	96017	OG002177	SED	100495	0	60		15N,23E,29, COUNTY A			
BLARINA	96020	OG002178	SED	92995	0	60		15N,23E,32, RIVER WILDLIFE AREA			
BLARINA	96022	OG002179	SED	100595	0	60		15N,23E,32, RIVER WILDLIFE AREA			
ZAPUS	96033	OG002180	SED	82595	0	60		15N,22E,22, COUNTY TT & 23			
ZAPUS	96034	OG002181	SED	82295	0	60		15N,22E,22, COUNTY TT & 23			
ZAPUS	96035	OG002182	SED	82995	0	60		15N,22E,22, COUNTY TT & 23			
ZAPUS	96036	OG002183	SED	82995	0	60		15N,22E,22, COUNTY TT & 23			
BLARINA	96040	OG002184	SED	82995	0	60		15N,22E,22, COUNTY TT & 23			
BLARINA	96046	OG002185	SED	92195	0	60		15N,23E,29, COUNTY A			
SWALLOW	98030	OI002076		62096	0	60		KA9			
SWALLOW	98031	OI002077		0	0	60		IA5			
SWALLO	98032	OI002078		61697	0	60		ML18			
SWALLO	98033	OI002079		72396	0	60		IA2			
SWALLO	98034	OI002080		61996	0	60		RW12			
SWALLO	98035	OI002081		61396	0	60		ML20			
SWALLOW	98036	OI002082		61797	0	60		TT10			
SWALLO	98037	OI002083		62397	0	60		ML3			
SWALLO	98038	OI002084		62097	0	60		ML20			

PERFAT	PCB	DIELDRIN	PPDDE	PPDDD	PPDDT	CISCHLOR	TRSCHLOR	CNONACH	TNONACH	HEXACHLR	ALPHABHC
	3.7										
	1.5										
	0.82										
	0.049										
	4.0										
	11.										
	7.4										
2.5	1.9										
2.8	13.										
3.1	7.3										
5.6	0.13										
4.1	ND										
5.1	ND										
4.2	ND										
2.7	ND										
2.2	7.0										
9.3											
6.4											
5.3											
10											
1.5											
4											
4.2											
6.7											
7.1											

USING TREE SWALLOWS TO MONITOR IMPACTS OF AQUATIC CONTAMINATION IN GREAT LAKES AREAS OF CONCERN **K.A. Patnode, B.L. Bodenstein, R.R. Hetzel, and S.S. Pearson. Department of Natural Resources, Madison, Wisconsin, 53707, U.S.A.**

Poster presented at the Society of Environmental Toxicology and Chemistry Annual Meeting - November 1996. Washington, D.C.

ABSTRACT

Tree swallows (*Tachycineta bicolor*) were used to evaluate movement and impacts of contaminants from sediments in Newton Creek (petroleum hydrocarbons; PHs) and Sheboygan River (PCBs). Study sites occurred along each river, while control sites were located upstream or on a nearby river. Productivity was monitored and eggs, day 1 and day 12-15 nestlings were collected. Homogenates were analyzed for PCBs or PHs. EROD activity in livers from day 12-15 nestlings was determined for both PCB and PH exposures. In Newton Creek, hatching success was reduced in the study site compared to the control site for the 2-year period ($p=0.0036$). PHs were detected in gastro-intestinal tracts of 1 nestling from the control and 1 from the study site in 1995, but not in any samples in 1996. In Sheboygan River, hatching success rates and EROD activity differed ($p=0.0001$ and $p=0.0054$) between control and study sites in 1995. Rates of growth were not significantly diffferent. All nestlings at control nests had negative PCB accumulation rates. Day 1 nestlings at study sites had negative rates due to growth dilution of egg burden, but accumulated PCBs between days 1 and 12. PCB accumulation in study sites was congener and site-dependent reflecting exposure via egg deposition and prey. Based on these pilot studies, we recommend using tree swallows for monitoring impacts of PCB contamination in conjunction with sediment and aquatic species. For PH-contaminated sites, suitability of tree swallows as indicators and detection of metabolites need further study, but EROD assays appear to provide a cost- effective screen for exposure to these complex mixtures.

INTRODUCTION

Previous studies with tree swallows (*Tachycineta bicolor*) suggest that they may be an appropriate indicator in Great Lakes Areas of Concern (Nichols et al. 1995, Bishop et al. 1995). Tree swallows are insectivorous birds feeding primarily on emergent invertebrates (Robertson et al. 1992). Invertebrates with aquatic larval stages may be a significant vector for movement of contaminants from sediment deposits (Nichols et al. 1995). With high nest site fidelity and small foraging ranges, tree swallows appear well suited as indicators of localized contamination. In the Lake Michigan basin, we wanted to apply and adapt tree swallow techniques developed at other PCB contamination sites to the Sheboygan River Area of Concern. Exposure to and bioaccumulation of PCBs is well documented in the aquatic food chain in this system, but movement of contaminants to avian and mammal species has yet to be established. The ability to induce tree swallows to nest in boxes enabled us to position study sites overlapping sediment and invertebrate sampling areas. Our objectives were to compare PCB accumulation above and below deposits, examine the screening capability of liver enzyme induction, and document impacts on reproduction.

In the Lake Superior basin, we wanted to evaluate the effectiveness of tree swallows as indicators of food chain exposure to petroleum hydrocarbons (PHs) associated with Newton Creek. PHs occur in sediment and aquatic invertebrates in an impoundment at the headwaters, the creek, and Hog Island inlet at the mouth of the creek. Our objectives were to compare exposure in swallow nestlings in the Newton Creek and an reference site in the adjacent Nemadji River basin, examine the potential screening capability of liver enzyme induction, and document impacts of PHs

on reproduction.

MATERIALS AND METHODS

Tree swallow nesting boxes were erected on each study area by May 1. Nesting activity was monitored every other day. At day 1 posthatching, one nestling and all unhatched eggs were collected. Livers were removed, frozen on dry ice, and stored at -70°C. Carcasses and eggs were wrapped in aluminum foil, shipped on dry ice, and stored at -20°C. On day 12, one nestling was collected and processed as for day 1. The remaining nestlings were banded with U.S. Fish and Wildlife Service bands for identification in subsequent years of the study.

For the Sheboygan River, homogenized carcasses and eggs were analyzed for 85 PCB congeners (individual and co-eluting) common to the Great Lakes ecosystem. Analyses were conducted by the Wisconsin State Laboratory of Hygiene (Wisconsin State Laboratory of Hygiene 1980, 1994).

In the Lake Superior Area of Concern, homogenized day 1 carcasses and gastro-intestinal (GI) tracts from day 12 nestlings were analyzed for hydrocarbons known to be present in Newton Creek and Hog Island Inlet. Analyses were conducted by the Oklahoma Animal Disease Diagnostic Laboratory using petroleum hydrocarbons and Newton Creek sediment samples as references.

For both study areas, microsomes were prepared and EROD activity was determined using the methods of Lin et al. (1989) with modifications as specified in Cormier et al. (1995). Protein concentrations of microsomes were determined using Pierce's BCA microtiter assay kit. EROD activity was determined by a kinetic measurement of resorufin formation and results are expressed as pmol/ mg protein/minute.

All stastistical analyses were conducting using SAS (SAS Institute, Cary, North Carolina). Hatching success data were compared by Fisher exact tests. PCB concentrations and log EROD activity data were analyzed using ANOVA with Duncan's multiple comparisons.

RESULTS AND DISCUSSION

Sheboygan River Area of Concern

Hatching success was significantly reduced in 1995 at control site 2 and combined study sites A&B compared to control site 1 with study site C being intermediate (Fig. 1.). Severe flooding in 1996 resulted in loss of nests and reduced nesting activity in all sites. The lack of differences between sites in this year may be attributable to a combination of this alternative, overriding environmental stress and the resulting smaller sample sizes. Rate of growth determined in 1996 did not differ significantly, but was lower at contaminated sites and did not exhibit a decline with increasing number of siblings (Fig. 2).

Tree swallow PCB concentrations differed significantly between sites and with age. Concentrations were highest at study sites A&B and lowest at control site 1 with control site 2 and study site C intermediate (Fig. 3.), which is similar to the pattern observed for hatching success (Fig. 1.). PCBs increased from sediment to larval invertebrates and from larval to emergent invertebrates (Fig. 3.). The PCB concentration was significantly reduced ($p=0.0052$) in day 1 nestlings compared to eggs, but increased 1.4- to 2.0-fold at study sites in contrast to 4.5- to 4.8-fold reductions of PCBs in control site nestlings. These findings are supported by both field observations and a PCB accumulation model which indicate that growth dilution from egg through first few days of hatching is followed by increases or decreases in PCB concentration dependent on the extent of prey contamination (Nichols et al. 1995).

Egg PCB concentrations are important to understanding the source(s) of contamination in older nestlings and adults. The concentrations in control 1&2 eggs were not significantly different

from those at study sites A, B or C, but did exhibit much greater variation (Fig. 3.). This observation suggests that some female birds nesting in upper segments of the river have previously been exposed to PCBs. Breeding females are known to relocate to new nests sites following an unsuccessful nesting year (Robertson et al. 1992). Thus, highly contaminated clutches in the control sites may be the result of relocation of unsuccessful, PCB-contaminated females. In 1996, we began banding adult and nestling birds to monitor movement and nest site fidelity within the basin. Documentation of such activity is critical to the design of an effective tree swallow monitoring program and evaluation of the ramifications of contaminant movement into uncontaminated ecosystems.

Changes in congener patterns were compared for control site 1 (Fig. 4.) and study site A (Fig. 5.) for sediments, larval, and emergent invertebrates, and tree swallow egg and nestlings. Congener 101 which is readily metabolized and congener 180 which is poorly metabolized by avian species (Borlakoglu et al. 1991) both increased slightly in percent composition from day 1 to day 12 nestlings at control 1 and study site A. Control site 1 eggs have a more diverse congener array than is present in the sediment and invertebrates suggesting outside sources of PCBs from adult females. Several congeners (28/31, 47/48, 66/95) display the same pattern seen for congener sums. However, congener 199, an octachlorobiphenyl, increases proportionally at each step in the food chain and at both sites. Relationships between congener patterns will be investigated by principal components analysis.

Hepatic EROD activity was compared between sites by years (Fig. 6). In 1995, day 12 nestlings at study sites (A,B&C) had elevated EROD as compared to control sites (1&2) ($p=0.0054$). In contrast, no significant difference was observed in 1996. A strong positive relationship between age and EROD activity in control sites was found in 1995. EROD activity was correlated with PCB concentration in study sites in 1995 (Fig. 7). Neither of these relationships was evident in 1996 (Fig. 8), but smaller sample size reduced the power of our analysis. Variability in contaminant concentration may warrant selection of sites that are greater than the 10 km apart to maximize concentration differences and encompass a small area to minimize concentration gradients within sites. Banding data may substantiate the degree and distance of movement between nest sites over time providing quantitative criteria for site selection. In addition, nestlings must be of exactly the same age for comparisons to be valid.

Lake Superior Area of Concern

Hatching success was significantly higher at the Nemadji River reference site compared to the Newton Creek impoundment and Hog Island inlet nests over the two year period (Fig. 9). PHs were detected in 2 out of 5 day 12 GI tracts on 1 samples each from control and study sites. PHs were not detected in 14 day 1 carcass homogenates from either site. Sediments from the control site have nondetectable to background concentrations of PHs. Males may forage as far as Newton Creek (1-2km) resulting in a positive detection within the GI tract of a Nemadji River nestling. Since both aliphatic and aromatic PHs are readily metabolized, the analysis that we used can only detect recent exposure. Testing for the presence of metabolites as in fish from contaminated sites (Maccubbin et al. 1988) should be evaluated as a chronic exposure assay in tree swallows.

Chronic exposure to aromatic hydrocarbons was suggested by significant induction ($p=0.056$) of liver EROD activity in day 12 nestlings from the Newton Creek basin as compared to the Nemadji River (Fig 10). We recommend the use of liver enzyme assays as a means of detecting exposure in tree swallows in PH-contaminated habitats as a screen for further analytical testing.

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Figure 1. Frequency distribution on hatching success of tree swallows at control and study sites in the Sheboygan River Area of Concern. Dissimilar letters denote significant differences ($p<0.05$) between sites in 1995. No significant differences in 1996.

Fig. 2. Comparison of growth rates of 1996 tree swallow nestlings between sites on the Sheboygan River with correction for number of siblings. Growth rates by site and sibling number were not significantly different (p=0.1976, n=1-3).

Figure 3. Concentration (± se) of PCB congener sums by compartment at control and study sites in Sheboygan River Area of Concern. Dissimilar letters denote significant differences for tree swallows between sites (abc;p=0.0001) or between ages (xy;p=0.0052).

Figure 4. Change in percent composition of congeners between compartments from sediment through day 12 tree swallows (1995) for Control Site 1.

Figure 5. Change in percent composition of congeners between compartments from sediment through day 12 tree swallows (1995) for Study Site A.

Figure 6. Hepatic log ethoxy-o-deethylase (EROD) activity in day 12-15 tree swallow nestlings by year at control (1,2) and study sites (A,B,C) in the Sheboygan River Area of Concern. *Dissimilar letters denote significant differences between groups of sites in 1995 (p=0.0054). No significant differences in 1996.

Figure 7. Comparison of the relationships between PCB congener sum and age versus hepatic EROD activity in day 12-15 tree swallows in 1995 for control (1,2) and study sites (A,B,C) in the Sheboygan River Area of Concern.

Figure 8. Comparison of the relationships between PCB congener sum and age versus hepatic EROD activity in day 12-15 tree swallows in 1996 for control (1,2) and study sites (A,B,C) in the Sheboygan River Area of Concern.

Figure 9. Frequency distribution on hatching success of tree swallows at control and study sites in the Lake Superior Area of Concern. *STUDY SITE hatching success is significantly lower (p=0.0036).

Figure 10. Hepatic log ethoxy-o-deethylase (EROD) activity in day 12 tree swallow nestlings at control and study sites in the Lake Superior Area of Concern. *STUDY SITE EROD activity is significantly higher (p=0.056).

Acknowledgements

Field work could not have been conducted without the logistical support and assistance of Fred Strand (WDNR-Brule, WI) and Dale Katsma (WDNR-Plymouth, WI). Miel Barman (SLOH-Madison, WI) devoted much time and effort to developing EROD assay capability and analyzing the liver samples. Dave Dagenhardt's laboratory (SLOH-Madison, WI) conducted the analyses for PCBs. Willliam Edwards' laboratory (Oklahoma State Univ-Stillwater, OK) was incredibly cooperative in trying to identify weathered PHs in tissues. Christine and Tom Custer (NBS-LaCrosse) provided guidance on methodology and analysis.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#61 of 58 on 09/08/98, unseen)

Id: Point/Well/..: Field #: 98036 Route: WM00
Collection Date: 06/17/97 Time: 00:00 County: 60 (Sheboygan)
From: TT10
Description: SWALLOW 12D
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 02/25/98 Labslip #: OI002082 Reported: 08/31/98

Comment: Y

---- test: PERCENT FAT IN TISSUE - 1410/1440			
PERCENT FAT	+	4.2	%
TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		ND (LOD=0.60 NG/G)	
#6 (2,3')		ND (LOD=3.0 NG/G)	
#5/8 (2,3/2,4')		ND (LOD=4.0 NG/G)	
#19 (2,2',6)		ND (LOD=1.0 NG/G)	
#18 (2,2',5)		ND (LOD=1.0 NG/G)	
#17 (2,2',4)		ND (LOD=0.80 NG/G)	
#24/27 (2,3,6/2,3',6)		ND (LOD=1.0 NG/G)	
#16/32 (2,2',3/2,4',6)		ND (LOD=1.0 NG/G)	
#26 (2,3',5)		ND (LOD=0.80 NG/G)	
#28/31 (2,4,4'/2,4',5)	+	2.6	NG/G
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)		ND (LOD=1.0 NG/G)	
#22 (2,3,4')		ND (LOD=1.2 NG/G)	
#45 (2,2',3,6)		ND (LOD=0.80 NG/G)	
#46 (2,2',3,6')		ND (LOD=1.0 NG/G)	
#52 (2,2',5,5')	+	2.5	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#49 (2,2',4,5')	+	1.5	NG/G
detected between 0.60 (LOD) and 2.0 (LOQ) NG/G			
#47/48 (2,2',4,4'/2,2',4,5)	+	1.9	NG/G
detected between 1.2 (LOD) and 4.0 (LOQ) NG/G			
#44 (2,2',3,5')		ND (LOD=1.1 NG/G)	
#37/42 (3,4,4'/2,2',3,4')		ND (LOD=1.1 NG/G)	
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)		ND (LOD=2.0 NG/G)	

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... continuing Labslip # OI002082, Field # 98036

#40 (2,2',3,3')		ND (LOD=1.0	NG/G)
#74 (2,4,4',5)	+	1.2	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#70/76 (2,3',4',5/2',3,4,5)		ND (LOD=2.4	NG/G)
#66/95 (2,3',4,4'/2,2',3,5',6)	+	6.7	NG/G
detected between 2.8 (LOD) and 9.2 (LOQ) NG/G			
#91 (2,2',3,4',6)		ND (LOD=1.0	NG/G)
#56/60 (2,3,3',4'/2,3,4,4')		ND (LOD=1.8	NG/G)
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <3.3	NG/G #1
#101 (2,2',4,5,5')	+	4.3	NG/G
#99 (2,2',4,4',5)	+	2.5	NG/G
#97 (2,2',3',4,5)		ND (LOD=0.80	NG/G)
#87 (2,2',3,4,5')	+	1.3	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#85 (2,2',3,4,4')		*I <62.	NG/G #1
#136 (2,2',3,3',6,6')		*I <31.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	4.2	NG/G
detected between 1.3 (LOD) and 4.3 (LOQ) NG/G			
#82 (2,2',3,3',4)		ND (LOD=1.0	NG/G)
#151 (2,2',3,5,5',6)		ND (LOD=1.0	NG/G)
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)		ND (LOD=0.80	NG/G)
#149 (2,2',3,4',5',6)	+	2.6	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#118 (2,3',4,4',5)	+	6.1	NG/G
#146 (2,2',3,4',5,5')	+	1.7	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	10.	NG/G
#141 (2,2',3,4,5,5')		ND (LOD=0.80	NG/G)
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		ND (LOD=1.0	NG/G)
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	7.8	NG/G
#178 (2,2',3,3',5,5',6)		ND (LOD=1.3	NG/G)
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	1.9	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#183 (2,2',3,4,4',5',6)		ND (LOD=1.8	NG/G)
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0	NG/G)
#174 (2,2',3,3',4,5,6')		ND (LOD=1.1	NG/G)
#177 (2,2',3,3',4',5,6)		ND (LOD=1.1	NG/G)
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')		ND (LOD=0.80	NG/G)
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		ND (LOD=1.8	NG/G)
#180 (2,2',3,4,4',5,5')	+	2.8	NG/G
detected between 2.2 (LOD) and 7.3 (LOQ) NG/G			
#199 (2,2',3,3',4,5,6,6')		*I <1.1	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <7.0	NG/G #1

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#201 (2,2',3,3',4,5,5',6)	ND (LOD=1.8	NG/G)
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	ND (LOD=3.0	NG/G)
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	ND (LOD=2.0	NG/G)
#194 (2,2',3,3',4,4',5,5')	ND (LOD=1.0	NG/G)
#206 (2,2',3,3',4,4',5,5',6)	ND (LOD=1.5	NG/G)
#128 (2,2',3,3',4,4')	ND (LOD=1.4	NG/G)
#167 (2,3',4,4',5,5')	ND (LOD=1.8	NG/G)

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77		<1.0	NG/G
#123		<1.0	NG/G
#105	+	2.7	NG/G
#126		<1.0	NG/G
#156	+	1.1	NG/G
#157		<1.0	NG/G
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: INTERFERENCE INDICATED BY *I.

124.8

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#63 of 58 on 09/08/98, unseen)

Id: Point/Well/..: Field #: 98037 Route: WM00
Collection Date: 06/23/97 Time: 00:00 County: 60 (Sheboygan)
From: ML3
Description: SWALLOW 12D
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 02/25/98 Labslip #: OI002083 Reported: 08/31/98

Comment: Y

---- test: PERCENT FAT IN TISSUE - 1410/1440

PERCENT FAT	+	6.7	%
TISSUE SAMPLE PREPARATION		C	

---- test: CONGENER ANALYSIS IN TISSUE - 1410

#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)		**	NG/G #1
#24/27 (2,3,6/2,3',6)		**	NG/G #1
#16/32 (2,2',3/2,4',6)		**	NG/G #1
#26 (2,3',5)		**	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	2.5	NG/G #1
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)		**	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	2.4	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#49 (2,2',4,5')	+	1.7	NG/G #1
detected between 0.60 (LOD) and 2.0 (LOQ) NG/G			
#47/48 (2,2',4,4'/2,2',4,5)	+	2.2	NG/G #1
detected between 1.2 (LOD) and 4.0 (LOQ) NG/G			
#44 (2,2',3,5')		**	NG/G #1
#37/42 (3,4,4'/2,2',3,4')		**	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)		ND (LOD=2.0 NG/G)	#1

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... continuing Labslip # OI002083, Field # 98037

#40 (2,2',3,3')		**	NG/G #1
#74 (2,4,4',5)		*I <1.5	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)		ND (LOD=2.4 NG/G)	#1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	6.8	NG/G #1
detected between 2.8 (LOD) and 9.2 (LOQ) NG/G			
#91 (2,2',3,4',6)		**	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')		**	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <3.1	NG/G #1
#101 (2,2',4,5,5')	+	5.9	NG/G #1
#99 (2,2',4,4',5)	+	3.0	NG/G #1
#97 (2,2',3',4,5)	+	1.1	NG/G #1
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	1.5	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#85 (2,2',3,4,4')		*I <30.	NG/G #1
#136 (2,2',3,3',6,6')		*I <15.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	4.8	NG/G #1
#82 (2,2',3,3',4)		**	NG/G #1
#151 (2,2',3,5,5',6)		**	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)		**	NG/G #1
#149 (2,2',3,4',5',6)	+	3.0	NG/G #1
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#118 (2,3',4,4',5)	+	9.1	NG/G #1
#146 (2,2',3,4',5,5')	+	3.7	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	21.	NG/G #1
#141 (2,2',3,4,5,5')		ND (LOD=0.80 NG/G)	#1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		ND (LOD=1.0 NG/G)	#1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	12.	NG/G #1
#178 (2,2',3,3',5,5',6)		ND (LOD=1.3 NG/G)	#1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	4.3	NG/G #1
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#183 (2,2',3,4,4',5',6)		ND (LOD=1.8 NG/G)	#1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')		ND (LOD=1.1 NG/G)	#1
#177 (2,2',3,3',4',5,6)	+	1.4	NG/G #1
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')		ND (LOD=0.80 NG/G)	#1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		ND (LOD=1.8 NG/G)	#1
#180 (2,2',3,4,4',5,5')		*I <6.2	NG/G #1
#199 (2,2',3,3',4,5,6,6')		**	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <3.5	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI002083, Field # 98037

#201 (2,2',3,3',4,5,5',6)	+	1.9	NG/G #1
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)		ND (LOD=3.0 NG/G)	#1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')		**	NG/G #1
#194 (2,2',3,3',4,4',5,5')		ND (LOD=1.0 NG/G)	#1
#206 (2,2',3,3',4,4',5,5',6)		**	NG/G #1
#128 (2,2',3,3',4,4')	+	1.4	NG/G #1
detected between 1.4 (LOD) and 4.6 (LOQ) NG/G			
#167 (2,3',4,4',5,5')		**	NG/G #1

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77		<1.0	NG/G
#123		<1.0	NG/G
#105	+	3.4	NG/G
#126		<1.0	NG/G
#156	+	1.8	NG/G
#157		<1.0	NG/G
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI002083.MM1

Memo for OI002083

--- OI002083.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for
Wisconsin State Laboratory of Hygiene sample OI002083.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#62 of 58 on 09/08/98, unseen)

Id: Point/Well/..: Field #: 98038 Route: WM00
Collection Date: 06/20/97 Time: 00:00 County: 60 (Sheboygan)
From: ML20
Description: SWALLOW 12D
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 02/25/98 Labslip #: OI002084 Reported: 08/31/98

Comment: Y

---- test: PERCENT FAT IN TISSUE - 1410/1440

PERCENT FAT	+	7.1	%
TISSUE SAMPLE PREPARATION		C	

---- test: CONGENER ANALYSIS IN TISSUE - 1410

#7 (2,4)		ND (LOD=0.60 NG/G)	
#6 (2,3')		ND (LOD=3.0 NG/G)	
#5/8 (2,3/2,4')		ND (LOD=4.0 NG/G)	
#19 (2,2',6)		ND (LOD=1.0 NG/G)	
#18 (2,2',5)		ND (LOD=1.0 NG/G)	
#17 (2,2',4)		ND (LOD=0.80 NG/G)	
#24/27 (2,3,6/2,3',6)		ND (LOD=1.0 NG/G)	
#16/32 (2,2',3/2,4',6)		ND (LOD=1.0 NG/G)	
#26 (2,3',5)		ND (LOD=0.80 NG/G)	
#28/31 (2,4,4'/2,4',5)	+	3.6	NG/G
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)		ND (LOD=1.0 NG/G)	
#22 (2,3,4')		ND (LOD=1.2 NG/G)	
#45 (2,2',3,6)		ND (LOD=0.80 NG/G)	
#46 (2,2',3,6')		ND (LOD=1.0 NG/G)	
#52 (2,2',5,5')	+	2.3	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#49 (2,2',4,5')	+	1.6	NG/G
detected between 0.60 (LOD) and 2.0 (LOQ) NG/G			
#47/48 (2,2',4,4'/2,2',4,5)	+	2.3	NG/G
detected between 1.2 (LOD) and 4.0 (LOQ) NG/G			
#44 (2,2',3,5')		ND (LOD=1.1 NG/G)	
#37/42 (3,4,4'/2,2',3,4')		ND (LOD=1.1 NG/G)	
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)		ND (LOD=2.0 NG/G)	

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI002084, Field # 98038

#40 (2,2',3,3')		ND (LOD=1.0	NG/G)
#74 (2,4,4',5)		*I <2.0	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)		ND (LOD=2.4	NG/G)
#66/95 (2,3',4,4'/2,2',3,5',6)	+	8.2	NG/G
detected between 2.8 (LOD) and 9.2 (LOQ) NG/G			
#91 (2,2',3,4',6)		ND (LOD=1.0	NG/G)
#56/60 (2,3,3',4'/2,3,4,4')		ND (LOD=1.8	NG/G)
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <3.1	NG/G #1
#101 (2,2',4,5,5')	+	5.4	NG/G
#99 (2,2',4,4',5)	+	3.1	NG/G
#97 (2,2',3',4,5)	+	1.3	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	1.6	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#85 (2,2',3,4,4')		*I <19.	NG/G #1
#136 (2,2',3,3',6,6')		*I <9.3	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	5.7	NG/G
#82 (2,2',3,3',4)		ND (LOD=1.0	NG/G)
#151 (2,2',3,5,5',6)		ND (LOD=1.0	NG/G)
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)		ND (LOD=0.80	NG/G)
#149 (2,2',3,4',5',6)	+	2.7	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#118 (2,3',4,4',5)	+	9.2	NG/G
#146 (2,2',3,4',5,5')	+	2.7	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	15.	NG/G
#141 (2,2',3,4,5,5')		ND (LOD=0.80	NG/G)
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		ND (LOD=1.0	NG/G)
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	10.	NG/G
#178 (2,2',3,3',5,5',6)		ND (LOD=1.3	NG/G)
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	3.0	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#183 (2,2',3,4,4',5',6)		ND (LOD=1.8	NG/G)
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0	NG/G)
#174 (2,2',3,3',4,5,6')		ND (LOD=1.1	NG/G)
#177 (2,2',3,3',4',5,6)		ND (LOD=1.1	NG/G)
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')		ND (LOD=0.80	NG/G)
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		ND (LOD=1.8	NG/G)
#180 (2,2',3,4,4',5,5')	+	4.5	NG/G
detected between 2.2 (LOD) and 7.3 (LOQ) NG/G			
#199 (2,2',3,3',4,5,6,6')		*I <1.3	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <3.7	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI002084, Field # 98038

#201 (2,2',3,3',4,5,5',6)	ND (LOD=1.8	NG/G)
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	ND (LOD=3.0	NG/G)
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	ND (LOD=2.0	NG/G)
#194 (2,2',3,3',4,4',5,5')	ND (LOD=1.0	NG/G)
#206 (2,2',3,3',4,4',5,5',6)	ND (LOD=1.5	NG/G)
#128 (2,2',3,3',4,4')	ND (LOD=1.4	NG/G)
#167 (2,3',4,4',5,5')	ND (LOD=1.8	NG/G)

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77		<1.0	NG/G
#123		<1.0	NG/G
#105	+	4.0	NG/G
#126		<1.0	NG/G
#156	+	1.6	NG/G
#157		<1.0	NG/G
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: INTERFERENCE INDICATED BY *I.

Proof

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#119 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98083 Route: WM00
Collection Date: 05/21/97 Time: 00:00 County: 60 (Sheboygan)
From: ML21
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Account number: WM001
Date Received: 06/11/98 Labslip #: OI003035 Reported: 07/17/98

Age - ID

Source: Tissue
Collected by:

Comment: Y

TISSUE SAMPLE PREPARATION			C
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)			ND (LOD=0.60 NG/G)
#6 (2,3')			ND (LOD=3.0 NG/G)
#5/8 (2,3/2,4')			ND (LOD=4.0 NG/G)
#19 (2,2',6)			ND (LOD=1.0 NG/G)
#18 (2,2',5)			ND (LOD=1.0 NG/G)
#17 (2,2',4)			ND (LOD=0.80 NG/G)
#24/27 (2,3,6/2,3',6)			ND (LOD=1.0 NG/G)
#16/32 (2,2',3/2,4',6)			ND (LOD=1.0 NG/G)
#26 (2,3',5)			ND (LOD=0.80 NG/G)
#28/31 (2,4,4'/2,4',5)	+	8.5	NG/G
#33 (2',3,4)			ND (LOD=1.0 NG/G)
#22 (2,3,4')			ND (LOD=1.2 NG/G)
#45 (2,2',3,6)			ND (LOD=0.80 NG/G)
#46 (2,2',3,6')			ND (LOD=1.0 NG/G)
#52 (2,2',5,5')	+	8.7	NG/G
#49 (2,2',4,5')	+	4.7	NG/G
#47/48 (2,2',4,4'/2,2',4,5)	+	8.8	NG/G
#44 (2,2',3,5')			ND (LOD=1.1 NG/G)
#37/42 (3,4,4'/2,2',3,4')			ND (LOD=1.1 NG/G)
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	2.4	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#40 (2,2',3,3')			ND (LOD=1.0 NG/G)
#74 (2,4,4',5)	+	5.7	NG/G
#70/76 (2,3',4',5/2',3,4,5)	+	4.8	NG/G
detected between 2.4 (LOD) and 8.0 (LOQ) NG/G			
#66/95 (2,3',4,4'/2,2',3,5',6)	+	26.	NG/G
#91 (2,2',3,4',6)	+	2.8	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			

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... continuing Labslip # OI003035, Field # 98083

#56/60 (2,3,3',4'/2,3,4,4')	+	4.6	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <11.	NG/G #1
#101 (2,2',4,5,5')	+	18.	NG/G
#99 (2,2',4,4',5)	+	8.7	NG/G
#97 (2,2',3',4,5)	+	1.2	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	4.2	NG/G
#85 (2,2',3,4,4')		*I <160.	NG/G #1
#136 (2,2',3,3',6,6')		*I <80.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	14.	NG/G
#82 (2,2',3,3',4)		ND (LOD=1.0 NG/G)	
#151 (2,2',3,5,5',6)	+	1.4	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	1.5	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#149 (2,2',3,4',5',6)	+	9.1	NG/G
#118 (2,3',4,4',5)	+	26.	NG/G
#146 (2,2',3,4',5,5')	+	7.5	NG/G
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	39.	NG/G
#141 (2,2',3,4,5,5')	+	1.9	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <1.8	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	34.	NG/G
#178 (2,2',3,3',5,5',6)	+	1.7	NG/G
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	7.5	NG/G
#183 (2,2',3,4,4',5',6)	+	3.4	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0 NG/G)	
#174 (2,2',3,3',4,5,6')	+	1.7	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#177 (2,2',3,3',4',5,6)	+	2.6	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	1.8	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	2.0	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#180 (2,2',3,4,4',5,5')	+	13.	NG/G
#199 (2,2',3,3',4,5,6,6')		*I <5.1	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <12.	NG/G #1

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... continuing Labslip # OI003035, Field # 98083

#201 (2,2',3,3',4,5,5',6)	+	5.1	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	5.2	NG/G
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	2.4	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	2.2	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#206 (2,2',3,3',4,4',5,5',6)	+	1.5	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	5.4	NG/G
#167 (2,3',4,4',5,5')		ND (LOD=1.8 NG/G)	

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	1.3	NG/G
#123		<1.0	NG/G
#105	+	11.	NG/G
#126		<1.0	NG/G
#156	+	4.8	NG/G
#157		*I <1.5	NG/G #1
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

585.1

Remark #1: INTERFERENCE INDICATED BY *I.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#122 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98084 Route: WM00
Collection Date: 06/10/97 Time: 00:00 County: 60 (Sheboygan)
From: ML20
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003036 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION			C
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)			ND (LOD=0.60 NG/G)
#6 (2,3')			ND (LOD=3.0 NG/G)
#5/8 (2,3/2,4')			ND (LOD=4.0 NG/G)
#19 (2,2',6)			ND (LOD=1.0 NG/G)
#18 (2,2',5)			ND (LOD=1.0 NG/G)
#17 (2,2',4)			ND (LOD=0.80 NG/G)
#24/27 (2,3,6/2,3',6)			ND (LOD=1.0 NG/G)
#16/32 (2,2',3/2,4',6)			ND (LOD=1.0 NG/G)
#26 (2,3',5)			*I <1.8 NG/G #1
#28/31 (2,4,4'/2,4',5)	+	6.7	NG/G
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)			ND (LOD=1.0 NG/G)
#22 (2,3,4')			ND (LOD=1.2 NG/G)
#45 (2,2',3,6)			ND (LOD=0.80 NG/G)
#46 (2,2',3,6')			ND (LOD=1.0 NG/G)
#52 (2,2',5,5')	+	7.2	NG/G
#49 (2,2',4,5')	+	4.9	NG/G
#47/48 (2,2',4,4'/2,2',4,5)	+	8.5	NG/G
#44 (2,2',3,5')			ND (LOD=1.1 NG/G)
#37/42 (3,4,4'/2,2',3,4')			ND (LOD=1.1 NG/G)
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	2.4	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#40 (2,2',3,3')			ND (LOD=1.0 NG/G)
#74 (2,4,4',5)	+	4.1	NG/G
#70/76 (2,3',4',5/2',3,4,5)	+	3.8	NG/G
detected between 2.4 (LOD) and 8.0 (LOQ) NG/G			
#66/95 (2,3',4,4'/2,2',3,5',6)	+	18.	NG/G
#91 (2,2',3,4',6)	+	2.2	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			

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... continuing Labslip # OI003036, Field # 98084

#56/60 (2,3,3',4'/2,3,4,4')	+	2.6	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <6.7	NG/G #1
#101 (2,2',4,5,5')	+	11.	NG/G
#99 (2,2',4,4',5)	+	7.0	NG/G
#97 (2,2',3',4,5)	+	0.95	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	3.0	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#85 (2,2',3,4,4')		*I <82.	NG/G #1
#136 (2,2',3,3',6,6')		*I <41.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	10.	NG/G
#82 (2,2',3,3',4)		ND (LOD=1.0 NG/G)	
#151 (2,2',3,5,5',6)		ND (LOD=1.0 NG/G)	
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	1.1	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#149 (2,2',3,4',5',6)	+	5.9	NG/G
#118 (2,3',4,4',5)	+	14.	NG/G
#146 (2,2',3,4',5,5')	+	5.3	NG/G
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	25.	NG/G
#141 (2,2',3,4,5,5')	+	0.91	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		ND (LOD=1.0 NG/G)	
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	19.	NG/G
#178 (2,2',3,3',5,5',6)	+	1.4	NG/G
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	7.0	NG/G
#183 (2,2',3,4,4',5',6)	+	3.0	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0 NG/G)	
#174 (2,2',3,3',4,5,6')		ND (LOD=1.1 NG/G)	
#177 (2,2',3,3',4',5,6)	+	1.8	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	1.5	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		ND (LOD=1.8 NG/G)	
#180 (2,2',3,4,4',5,5')	+	12.	NG/G
#199 (2,2',3,3',4,5,6,6')		*I <10.	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <7.5	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003036, Field # 98084

#201 (2,2',3,3',4,5,5',6)	+	5.3	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	5.8	NG/G
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	2.6	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	2.1	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#206 (2,2',3,3',4,4',5,5',6)	+	1.8	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	3.2	NG/G
detected between 1.4 (LOD) and 4.6 (LOQ) NG/G			
#167 (2,3',4,4',5,5')		ND (LOD=1.8 NG/G)	

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	1.0	NG/G
#123		<1.0	NG/G
#105	+	6.9	NG/G
#126		<1.0	NG/G
#156	+	2.8	NG/G
#157		*I <1.2	NG/G #1
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: INTERFERENCE INDICATED BY *I.

369, 570

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#123 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98085 Route: WM00
Collection Date: 06/10/97 Time: 00:00 County: 60 (Sheboygan)
From: ML3
Description: SWALLOW ID
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003037 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		ND (LOD=0.60	NG/G)
#6 (2,3')		ND (LOD=3.0	NG/G)
#5/8 (2,3/2,4')		ND (LOD=4.0	NG/G)
#19 (2,2',6)		ND (LOD=1.0	NG/G)
#18 (2,2',5)		ND (LOD=1.0	NG/G)
#17 (2,2',4)	+	1.3	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#24/27 (2,3,6/2,3',6)		ND (LOD=1.0	NG/G)
#16/32 (2,2',3/2,4',6)	+	1.1	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#26 (2,3',5)	+	1.4	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#28/31 (2,4,4'/2,4',5)	+	6.6	NG/G
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)		ND (LOD=1.0	NG/G)
#22 (2,3,4')		ND (LOD=1.2	NG/G)
#45 (2,2',3,6)		ND (LOD=0.80	NG/G)
#46 (2,2',3,6')		ND (LOD=1.0	NG/G)
#52 (2,2',5,5')	+	6.4	NG/G
#49 (2,2',4,5')	+	4.3	NG/G
#47/48 (2,2',4,4'/2,2',4,5)	+	6.6	NG/G
#44 (2,2',3,5')	+	1.9	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#37/42 (3,4,4'/2,2',3,4')		ND (LOD=1.1	NG/G)
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	2.7	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003037, Field # 98085

#40 (2,2',3,3')		ND (LOD=1.0	NG/G)
#74 (2,4,4',5)	+	3.4	NG/G
#70/76 (2,3',4',5/2',3,4,5)	+	4.7	NG/G
detected between 2.4 (LOD) and 8.0 (LOQ) NG/G			
#66/95 (2,3',4,4'/2,2',3,5',6)	+	18.	NG/G
#91 (2,2',3,4',6)	+	2.1	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#56/60 (2,3,3',4'/2,3,4,4')	+	2.5	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <1.5	NG/G #1
#101 (2,2',4,5,5')	+	13.	NG/G
#99 (2,2',4,4',5)	+	8.8	NG/G
#97 (2,2',3',4,5)	+	1.5	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	3.5	NG/G
#85 (2,2',3,4,4')		*I <220.	NG/G #1
#136 (2,2',3,3',6,6')		*I <110.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	10.	NG/G
#82 (2,2',3,3',4)		ND (LOD=1.0	NG/G)
#151 (2,2',3,5,5',6)	+	1.2	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	1.4	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#149 (2,2',3,4',5',6)	+	8.3	NG/G
#118 (2,3',4,4',5)	+	24.	NG/G
#146 (2,2',3,4',5,5')	+	11.	NG/G
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	53.	NG/G
#141 (2,2',3,4,5,5')	+	2.1	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <2.0	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	47.	NG/G
#178 (2,2',3,3',5,5',6)	+	3.5	NG/G
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	15.	NG/G
#183 (2,2',3,4,4',5',6)	+	7.4	NG/G
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0	NG/G)
#174 (2,2',3,3',4,5,6')	+	2.6	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#177 (2,2',3,3',4',5,6)	+	5.1	NG/G
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	3.6	NG/G
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	3.1	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#180 (2,2',3,4,4',5,5')	+	26.	NG/G
#199 (2,2',3,3',4,5,6,6')		*I <2.1	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <17.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003037, Field # 98085

#201 (2,2',3,3',4,5,5',6)	+	8.4	NG/G
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	9.4	NG/G
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	4.9	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	3.7	NG/G
#206 (2,2',3,3',4,4',5,5',6)	+	2.4	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	6.6	NG/G
#167 (2,3',4,4',5,5')		ND (LOD=1.8 NG/G)	

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	1.1	NG/G
#123		<1.0	NG/G
#105	+	9.0	NG/G
#126		<1.0	NG/G
#156	+	4.4	NG/G
#157		*I <2.2	NG/G #1
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

7/6.1

Remark #1: INTERFERENCE INDICATED BY *I.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#126 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98086 Route: WM00
Collection Date: 06/12/97 Time: 00:00 County: 60 (Sheboygan)
From: TT10
Description: SWALLOW 1D
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003038 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION			C
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)			ND (LOD=0.60 NG/G)
#6 (2,3')			ND (LOD=3.0 NG/G)
#5/8 (2,3/2,4')			ND (LOD=4.0 NG/G)
#19 (2,2',6)			ND (LOD=1.0 NG/G)
#18 (2,2',5)			ND (LOD=1.0 NG/G)
#17 (2,2',4)			ND (LOD=0.80 NG/G)
#24/27 (2,3,6/2,3',6)			ND (LOD=1.0 NG/G)
#16/32 (2,2',3/2,4',6)			ND (LOD=1.0 NG/G)
#26 (2,3',5)			ND (LOD=0.80 NG/G)
#28/31 (2,4,4'/2,4',5)	+	4.7	NG/G
detected between 2.5 (LOD) and 8.2 (LOQ) NG/G			
#33 (2',3,4)			ND (LOD=1.0 NG/G)
#22 (2,3,4')			ND (LOD=1.2 NG/G)
#45 (2,2',3,6)			ND (LOD=0.80 NG/G)
#46 (2,2',3,6')			ND (LOD=1.0 NG/G)
#52 (2,2',5,5')	+	4.9	NG/G
#49 (2,2',4,5')	+	3.5	NG/G
#47/48 (2,2',4,4'/2,2',4,5)	+	5.4	NG/G
#44 (2,2',3,5')			ND (LOD=1.1 NG/G)
#37/42 (3,4,4'/2,2',3,4')			ND (LOD=1.1 NG/G)
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	2.2	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#40 (2,2',3,3')			ND (LOD=1.0 NG/G)
#74 (2,4,4',5)	+	2.8	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#70/76 (2,3',4',5/2',3,4,5)	+	3.1	NG/G
detected between 2.4 (LOD) and 8.0 (LOQ) NG/G			
#66/95 (2,3',4,4'/2,2',3,5',6)	+	14.	NG/G
#91 (2,2',3,4',6)	+	1.5	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003038, Field # 98086

#56/60 (2,3,3',4'/2,3,4,4')	+	1.9	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <6.1	NG/G #1
#101 (2,2',4,5,5')	+	8.2	NG/G
#99 (2,2',4,4',5)	+	5.7	NG/G
#97 (2,2',3',4,5)	+	0.85	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#87 (2,2',3,4,5')	+	2.7	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#85 (2,2',3,4,4')		*I <210.	NG/G #1
#136 (2,2',3,3',6,6')		*I <105.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	8.5	NG/G
#82 (2,2',3,3',4)		ND (LOD=1.0 NG/G)	
#151 (2,2',3,5,5',6)	+	1.1	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	0.87	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#149 (2,2',3,4',5',6)	+	5.2	NG/G
#118 (2,3',4,4',5)	+	13.	NG/G
#146 (2,2',3,4',5,5')	+	4.5	NG/G
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	23.	NG/G
#141 (2,2',3,4,5,5')	+	1.0	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		ND (LOD=1.0 NG/G)	
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	19.	NG/G
#178 (2,2',3,3',5,5',6)	+	1.3	NG/G
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	6.4	NG/G
#183 (2,2',3,4,4',5',6)	+	2.7	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#185 (2,2',3,4,5,5',6)		ND (LOD=1.0 NG/G)	
#174 (2,2',3,3',4,5,6')	+	1.4	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#177 (2,2',3,3',4',5,6)	+	2.1	NG/G
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	1.4	NG/G
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		ND (LOD=1.8 NG/G)	
#180 (2,2',3,4,4',5,5')		*I <10.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <1.9	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <6.4	NG/G #1

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... continuing Labslip # OI003038, Field # 98086

#201 (2,2',3,3',4,5,5',6)	+	4.5	NG/G
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	4.8	NG/G
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	2.3	NG/G
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	1.9	NG/G
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#206 (2,2',3,3',4,4',5,5',6)	+	1.6	NG/G
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	2.9	NG/G
detected between 1.4 (LOD) and 4.6 (LOQ) NG/G			
#167 (2,3',4,4',5,5')		ND (LOD=1.8 NG/G)	

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77		<1.0	NG/G
#123		<1.0	NG/G
#105	+	4.9	NG/G
#126		<1.0	NG/G
#156	+	2.1	NG/G
#157		<1.0	NG/G
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

5/5/12

Remark #1: INTERFERENCE INDICATED BY *I.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#124 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98087 Route: WM00
Collection Date: 06/10/97 Time: 00:00 County: 60 (Sheboygan)
From: RW9
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003039 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)	+	11.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	4.6	NG/G #1
#16/32 (2,2',3/2,4',6)	+	7.6	NG/G #1
#26 (2,3',5)		*I <3.5	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	770.	NG/G #1
#33 (2',3,4)	+	41.	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	630.	NG/G #1
#49 (2,2',4,5')	+	500.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	880.	NG/G #1
#44 (2,2',3,5')	+	62.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	54.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	260.	NG/G #1
#40 (2,2',3,3')		*I <3.0	NG/G #1
#74 (2,4,4',5)	+	450.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	370.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	1500.	NG/G #1
#91 (2,2',3,4',6)	+	230.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	340.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <470.	NG/G #1
#101 (2,2',4,5,5')	+	670.	NG/G #1
#99 (2,2',4,4',5)	+	490.	NG/G #1
#97 (2,2',3',4,5)	+	85.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003039, Field # 98087

#87 (2,2',3,4,5')	+	180.	NG/G #1
#85 (2,2',3,4,4')		*I <340.	NG/G #1
#136 (2,2',3,3',6,6')		*I <170.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	750.	NG/G #1
#82 (2,2',3,3',4)	+	15.	NG/G #1
#151 (2,2',3,5,5',6)	+	38.	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	48.	NG/G #1
#149 (2,2',3,4',5',6)	+	280.	NG/G #1
#118 (2,3',4,4',5)	+	840.	NG/G #1
#146 (2,2',3,4',5,5')	+	160.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	820.	NG/G #1
#141 (2,2',3,4,5,5')	+	45.	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <48.	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	700.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	26.	NG/G #1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	100.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	49.	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	29.	NG/G #1
#177 (2,2',3,3',4',5,6)	+	53.	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	27.	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	28.	NG/G #1
#180 (2,2',3,4,4',5,5')	+	190.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <5.2	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)	+	180.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	36.	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	41.	NG/G #1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	24.	NG/G #1
#194 (2,2',3,3',4,4',5,5')	+	23.	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	6.7	NG/G #1
#128 (2,2',3,3',4,4')	+	100.	NG/G #1
#167 (2,3',4,4',5,5')	+	38.	NG/G #1

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	62.	NG/G
#123	+	30.	NG/G
#105	+	460.	NG/G
#126	+	2.6	NG/G
#156	+	110.	NG/G
#157	+	25.	NG/G
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

State Laboratory of Hygiene
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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003039, Field # 98087

Remark #1: SEE OI003039.MM1

Memo for OI003039

--- OI003039.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003039.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#120 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98088 Route: WM00
Collection Date: 06/02/97 Time: 00:00 County: 60 (Sheboygan)
From: IA5
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003040 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)	+	8.3	NG/G #1
#24/27 (2,3,6/2,3',6)	+	1.4	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#16/32 (2,2',3/2,4',6)	+	5.5	NG/G #1
#26 (2,3',5)		*I <4.0	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	290.	NG/G #1
#33 (2',3,4)	+	5.9	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	150.	NG/G #1
#49 (2,2',4,5')	+	150.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	280.	NG/G #1
#44 (2,2',3,5')	+	19.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	18.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	120.	NG/G #1
#40 (2,2',3,3')	+	1.5	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#74 (2,4,4',5)	+	140.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	170.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	390.	NG/G #1
#91 (2,2',3,4',6)	+	61.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003040, Field # 98088

#56/60 (2,3,3',4'/2,3,4,4')	+	95.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <100.	NG/G #1
#101 (2,2',4,5,5')	+	190.	NG/G #1
#99 (2,2',4,4',5)	+	120.	NG/G #1
#97 (2,2',3',4,5)	+	21.	NG/G #1
#87 (2,2',3,4,5')	+	62.	NG/G #1
#85 (2,2',3,4,4')		*I <98.	NG/G #1
#136 (2,2',3,3',6,6')		*I <75.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	260.	NG/G #1
#82 (2,2',3,3',4)	+	5.1	NG/G #1
#151 (2,2',3,5,5',6)	+	9.3	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	8.2	NG/G #1
#149 (2,2',3,4',5',6)	+	49.	NG/G #1
#118 (2,3',4,4',5)	+	260.	NG/G #1
#146 (2,2',3,4',5,5')	+	39.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	200.	NG/G #1
#141 (2,2',3,4,5,5')	+	8.5	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <7.8	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	180.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	5.0	NG/G #1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	21.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	9.1	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	5.0	NG/G #1
#177 (2,2',3,3',4',5,6)	+	9.1	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	5.2	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	5.3	NG/G #1
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#180 (2,2',3,4,4',5,5')	+	38.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <3.4	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <41.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	8.7	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	9.6	NG/G #1
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	5.0	NG/G #1
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	5.3	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	2.5	NG/G #1
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	27.	NG/G #1
#167 (2,3',4,4',5,5')	+	9.1	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003040, Field # 98088

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	20.	NG/G
#123	+	6.7	NG/G
#105	+	130.	NG/G
#126		<1.0	NG/G
#156	+	29.	NG/G
#157		*I <5.4	NG/G #2
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003040.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003040

--- OI003040.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003040.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#127 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98089 Route: WM00
Collection Date: 06/16/97 Time: 00:00 County: 60 (Sheboygan)
From: IA6-1
Description: SWALLOW ID
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003041 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)	+	2.4	NG/G #1
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#24/27 (2,3,6/2,3',6)		**	NG/G #1
#16/32 (2,2',3/2,4',6)		**	NG/G #1
#26 (2,3',5)		*I <3.2	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	110.	NG/G #1
#33 (2',3,4)	+	4.3	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	64.	NG/G #1
#49 (2,2',4,5')	+	55.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	100.	NG/G #1
#44 (2,2',3,5')	+	12.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	10.0	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	45.	NG/G #1
#40 (2,2',3,3')		**	NG/G #1
#74 (2,4,4',5)	+	55.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	68.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	180.	NG/G #1
#91 (2,2',3,4',6)	+	20.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003041, Field # 98089

#56/60 (2,3,3',4'/2,3,4,4')	+	38.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <48.	NG/G #1
#101 (2,2',4,5,5')	+	67.	NG/G #1
#99 (2,2',4,4',5)	+	51.	NG/G #1
#97 (2,2',3',4,5)	+	13.	NG/G #1
#87 (2,2',3,4,5')	+	24.	NG/G #1
#85 (2,2',3,4,4')		*I <280.	NG/G #1
#136 (2,2',3,3',6,6')		*I <140.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	94.	NG/G #1
#82 (2,2',3,3',4)	+	3.1	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#151 (2,2',3,5,5',6)	+	5.3	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	4.8	NG/G #1
#149 (2,2',3,4',5',6)	+	27.	NG/G #1
#118 (2,3',4,4',5)	+	110.	NG/G #1
#146 (2,2',3,4',5,5')	+	22.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	99.	NG/G #1
#141 (2,2',3,4,5,5')	+	4.2	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <4.8	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	94.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	3.7	NG/G #1
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	16.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	6.8	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	3.5	NG/G #1
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#177 (2,2',3,3',4',5,6)	+	6.6	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	4.0	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	4.8	NG/G #1
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#180 (2,2',3,4,4',5,5')	+	31.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <3.0	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <43.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	7.1	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	8.3	NG/G #1
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')		**	NG/G #1
#194 (2,2',3,3',4,4',5,5')	+	4.5	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)		**	NG/G #1
#128 (2,2',3,3',4,4')	+	15.	NG/G #1
#167 (2,3',4,4',5,5')		*I <4.8	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003041, Field # 98089

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	8.4	NG/G
#123	+	3.4	NG/G
#105	+	51.	NG/G
#126		<1.0	NG/G
#156	+	14.	NG/G
#157		*I <3.0	NG/G #2
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003041.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003041

--- OI003041.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003041.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#129 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98090 Route: WM00
Collection Date: 06/16/97 Time: 00:00 County: 60 (Sheboygan)
From: IA6-2
Description: SWALLOW ID
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003042 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)		**	NG/G #1
#24/27 (2,3,6/2,3',6)		**	NG/G #1
#16/32 (2,2',3/2,4',6)		**	NG/G #1
#26 (2,3',5)		**	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	100.	NG/G #1
#33 (2',3,4)	+	3.7	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	56.	NG/G #1
#49 (2,2',4,5')	+	48.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	95.	NG/G #1
#44 (2,2',3,5')	+	7.8	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	6.3	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	40.	NG/G #1
#40 (2,2',3,3')		**	NG/G #1
#74 (2,4,4',5)	+	50.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	55.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	160.	NG/G #1
#91 (2,2',3,4',6)	+	18.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	32.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <42.	NG/G #1
#101 (2,2',4,5,5')	+	60.	NG/G #1
#99 (2,2',4,4',5)	+	45.	NG/G #1
#97 (2,2',3',4,5)	+	9.8	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003042, Field # 98090

#87 (2,2',3,4,5')	+	21.	NG/G #1
#85 (2,2',3,4,4')		*I <270.	NG/G #1
#136 (2,2',3,3',6,6')		*I <140.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	81.	NG/G #1
#82 (2,2',3,3',4)	+	2.1	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#151 (2,2',3,5,5',6)	+	4.7	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	4.3	NG/G #1
#149 (2,2',3,4',5',6)	+	24.	NG/G #1
#118 (2,3',4,4',5)	+	110.	NG/G #1
#146 (2,2',3,4',5,5')	+	21.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	89.	NG/G #1
#141 (2,2',3,4,5,5')	+	3.8	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <4.4	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	85.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	3.6	NG/G #1
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	16.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	6.5	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	3.1	NG/G #1
detected between 1.1 (LOD) and 3.6 (LOQ) NG/G			
#177 (2,2',3,3',4',5,6)	+	6.1	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	3.8	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	3.9	NG/G #1
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G			
#180 (2,2',3,4,4',5,5')		*I <28.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <3.0	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <39.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	7.2	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	8.4	NG/G #1
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	4.2	NG/G #1
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	4.3	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)		**	NG/G #1
#128 (2,2',3,3',4,4')	+	14.	NG/G #1
#167 (2,3',4,4',5,5')		*I <4.2	NG/G #1

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	7.1	NG/G
#123	+	3.0	NG/G
#105	+	47.	NG/G
#126		<1.0	NG/G
#156	+	15.	NG/G

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003042, Field # 98090

#157	*I <3.0	NG/G #2
#169	<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003042.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003042

--- OI003042.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003042.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#131 of 83 on 07/20/98, unseen)

Id: Point/Well/..: Field #: 98091 Route: WM00
Collection Date: 06/16/97 Time: 00:00 County: 60 (Sheboygan)
From: RW12
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003043 Reported: 07/17/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)	+	14.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	3.4	NG/G #1
#16/32 (2,2',3/2,4',6)	+	6.0	NG/G #1
#26 (2,3',5)		*I <5.0	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	190.	NG/G #1
#33 (2',3,4)	+	15.	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	130.	NG/G #1
#49 (2,2',4,5')	+	110.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	210.	NG/G #1
#44 (2,2',3,5')	+	35.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	30.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	88.	NG/G #1
#40 (2,2',3,3')		*I <2.9	NG/G #1
#74 (2,4,4',5)	+	100.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	80.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	300.	NG/G #1
#91 (2,2',3,4',6)	+	38.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	61.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <9.7	NG/G #1
#101 (2,2',4,5,5')	+	110.	NG/G #1
#99 (2,2',4,4',5)	+	90.	NG/G #1
#97 (2,2',3',4,5)	+	23.	NG/G #1

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... continuing Labslip # OI003043, Field # 98091

#87 (2,2',3,4,5')	+	36.	NG/G #1
#85 (2,2',3,4,4')		*I <150.	NG/G #1
#136 (2,2',3,3',6,6')		*I <74.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	150.	NG/G #1
#82 (2,2',3,3',4)	+	6.1	NG/G #1
#151 (2,2',3,5,5',6)	+	5.7	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	7.5	NG/G #1
#149 (2,2',3,4',5',6)	+	39.	NG/G #1
#118 (2,3',4,4',5)	+	160.	NG/G #1
#146 (2,2',3,4',5,5')	+	21.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	120.	NG/G #1
#141 (2,2',3,4,5,5')	+	5.4	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <4.7	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	100.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	3.4	NG/G #1
detected between 1.3 (LOD) and 4.2 (LOQ) NG/G			
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	14.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	6.6	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	4.2	NG/G #1
#177 (2,2',3,3',4',5,6)	+	6.3	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	3.9	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')		**	NG/G #1
#180 (2,2',3,4,4',5,5')		*I <26.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <5.8	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <36.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	8.6	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	9.0	NG/G #1
detected between 3.0 (LOD) and 9.9 (LOQ) NG/G			
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	4.7	NG/G #1
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G			
#194 (2,2',3,3',4,4',5,5')	+	4.0	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	3.7	NG/G #1
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	16.	NG/G #1
#167 (2,3',4,4',5,5')		*I <4.0	NG/G #1
---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC			
#77	+	11.	NG/G
#123	+	4.9	NG/G
#105	+	62.	NG/G
#126		<1.0	NG/G
#156	+	15.	NG/G

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003043, Field # 98091

#157	*I	<3.0	NG/G #2
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003043.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003043

--- OI003043.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003043.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#39 of 40 on 08/17/98, unseen)

Id: Point/Well/..: Field #: 98092 Route: WM00
Collection Date: 07/09/97 Time: 00:00 County: 60 (Sheboygan)
From: RW9
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003044 Reported: 08/14/98

Comment: Y

TISSUE SAMPLE PREPARATION C

---- test: CONGENER ANALYSIS IN TISSUE - 1410

#7 (2,4)		**	NG/G #1
#6 (2,3')		ND (LOD=3.0 NG/G)	#1
#5/8 (2,3/2,4')	+	35.	NG/G #1
#19 (2,2',6)	+	6.7	NG/G #1
#18 (2,2',5)	+	14.	NG/G #1
#17 (2,2',4)	+	44.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	10.	NG/G #1
#16/32 (2,2',3/2,4',6)	+	38.	NG/G #1
#26 (2,3',5)	+	26.	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	300.	NG/G #1
#33 (2',3,4)	+	36.	NG/G #1
#22 (2,3,4')	+	12.	NG/G #1
#45 (2,2',3,6)	+	7.9	NG/G #1
#46 (2,2',3,6')	+	3.7	NG/G #1
#52 (2,2',5,5')	+	290.	NG/G #1
#49 (2,2',4,5')	+	240.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	400.	NG/G #1
#44 (2,2',3,5')	+	98.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	66.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	190.	NG/G #1
#40 (2,2',3,3')	+	7.6	NG/G #1
#74 (2,4,4',5)	+	190.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	200.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	650.	NG/G #1
#91 (2,2',3,4',6)	+	110.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	140.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')	+	28.	NG/G #1
#101 (2,2',4,5,5')	+	270.	NG/G #1
#99 (2,2',4,4',5)	+	190.	NG/G #1
#97 (2,2',3',4,5)	+	58.	NG/G #1

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... continuing Labslip # OI003044, Field # 98092

#87 (2,2',3,4,5')	+	86.	NG/G #1
#85 (2,2',3,4,4')		*I <114.	NG/G #1
#136 (2,2',3,3',6,6')		*I <77.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	360.	NG/G #1
#82 (2,2',3,3',4)	+	16.	NG/G #1
#151 (2,2',3,5,5',6)	+	15.	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	17.	NG/G #1
#149 (2,2',3,4',5',6)	+	100.0	NG/G #1
#118 (2,3',4,4',5)	+	300.	NG/G #1
#146 (2,2',3,4',5,5')	+	63.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	320.	NG/G #1
#141 (2,2',3,4,5,5')	+	16.	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <15.	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	250.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	7.2	NG/G #1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	31.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	16.	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	10.	NG/G #1
#177 (2,2',3,3',4',5,6)	+	15.	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	8.4	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	7.8	NG/G #1
#180 (2,2',3,4,4',5,5')	+	53.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <2.1	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <48.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	11.	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	13.	NG/G #1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	6.6	NG/G #1
#194 (2,2',3,3',4,4',5,5')	+	7.0	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	2.6	NG/G #1
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G			
#128 (2,2',3,3',4,4')	+	40.	NG/G #1
#167 (2,3',4,4',5,5')	+	9.1	NG/G #1
---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC			
#77	+	22.	NG/G
#123	+	7.9	NG/G
#105	+	160.	NG/G
#126		<1.0	NG/G
#156	+	40.	NG/G
#157		*I <8.8	NG/G #2
#169		<1.0	NG/G

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... continuing Labslip # OI003044, Field # 98092

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003044.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003044

--- OI003044.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003044.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#35 of 40 on 08/17/98, unseen)

Id: Point/Well/..: Field #: 98093 Route: WM00
Collection Date: 06/16/97 Time: 00:00 County: 60 (Sheboygan)
From: RW4
Description: SWALLOW D
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003045 Reported: 08/14/98

Comment: Y

TISSUE SAMPLE PREPARATION C

---- test: CONGENER ANALYSIS IN TISSUE - 1410

#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)	+	8.3	NG/G #1
#18 (2,2',5)	+	6.4	NG/G #1
#17 (2,2',4)	+	34.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	15.	NG/G #1
#16/32 (2,2',3/2,4',6)	+	36.	NG/G #1
#26 (2,3',5)	+	27.	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	600.	NG/G #1
#33 (2',3,4)	+	55.	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')	+	3.2	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#52 (2,2',5,5')	+	460.	NG/G #1
#49 (2,2',4,5')	+	380.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	800.	NG/G #1
#44 (2,2',3,5')	+	110.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	99.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	280.	NG/G #1
#40 (2,2',3,3')	+	6.1	NG/G #1
#74 (2,4,4',5)	+	280.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	300.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	880.	NG/G #1
#91 (2,2',3,4',6)	+	160.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003045, Field # 98093

#56/60 (2,3,3',4'/2,3,4,4')	+	150.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')	+	33.	NG/G #1
#101 (2,2',4,5,5')	+	320.	NG/G #1
#99 (2,2',4,4',5)	+	260.	NG/G #1
#97 (2,2',3',4,5)	+	85.	NG/G #1
#87 (2,2',3,4,5')	+	110.	NG/G #1
#85 (2,2',3,4,4')		*I <170.	NG/G #1
#136 (2,2',3,3',6,6')		*I <170.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	480.	NG/G #1
#82 (2,2',3,3',4)	+	22.	NG/G #1
#151 (2,2',3,5,5',6)	+	15.	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	26.	NG/G #1
#149 (2,2',3,4',5',6)	+	140.	NG/G #1
#118 (2,3',4,4',5)	+	350.	NG/G #1
#146 (2,2',3,4',5,5')	+	57.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	300.	NG/G #1
#141 (2,2',3,4,5,5')	+	17.	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <15.	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	270.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	8.0	NG/G #1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	30.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	18.	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	15.	NG/G #1
#177 (2,2',3,3',4',5,6)	+	17.	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	11.	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	8.9	NG/G #1
#180 (2,2',3,4,4',5,5')	+	58.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <3.4	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <50.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	16.	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	21.	NG/G #1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	9.5	NG/G #1
#194 (2,2',3,3',4,4',5,5')	+	10.	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	5.4	NG/G #1
#128 (2,2',3,3',4,4')	+	46.	NG/G #1
#167 (2,3',4,4',5,5')	+	8.9	NG/G #1

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	22.	NG/G
#123	+	10.	NG/G
#105	+	180.	NG/G
#126		<1.0	NG/G
#156	+	35.	NG/G

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003045, Field # 98093

#157	*I <7.3	NG/G #2
#169	<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003045.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003045

--- OI003045.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003045.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#31 of 40 on 08/17/98, unseen)

Id: ~~Point/Well/..:~~ Field #: 98094 Route: WM00
Collection Date: 06/09/96 Time: 00:00 County: 60 (Sheboygan)
From: KA9
Description: SWALLOW LD
To: KATHY PATNODE - DNR
GEF II - WM/4 Source: Tissue
MADISON
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003046 Reported: 08/14/98

Comment: Y

TISSUE SAMPLE PREPARATION C

---- test: CONGENER ANALYSIS IN TISSUE - 1410

#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')	+	14.	NG/G #1
#19 (2,2',6)	+	8.2	NG/G #1
#18 (2,2',5)	+	5.9	NG/G #1
#17 (2,2',4)	+	53.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	21.	NG/G #1
#16/32 (2,2',3/2,4',6)	+	53.	NG/G #1
#26 (2,3',5)	+	48.	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	560.	NG/G #1
#33 (2',3,4)	+	55.	NG/G #1
#22 (2,3,4')	+	6.6	NG/G #1
#45 (2,2',3,6)	+	4.2	NG/G #1
#46 (2,2',3,6')	+	3.7	NG/G #1
#52 (2,2',5,5')	+	520.	NG/G #1
#49 (2,2',4,5')	+	430.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	810.	NG/G #1
#44 (2,2',3,5')	+	140.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	140.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	320.	NG/G #1
#40 (2,2',3,3')	+	9.9	NG/G #1
#74 (2,4,4',5)	+	290.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	280.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	1000.	NG/G #1
#91 (2,2',3,4',6)	+	200.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	190.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')	+	54.	NG/G #1
#101 (2,2',4,5,5')	+	450.	NG/G #1
#99 (2,2',4,4',5)	+	300.	NG/G #1
#97 (2,2',3',4,5)	+	120.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003046, Field # 98094

#87 (2,2',3,4,5')	+	150.	NG/G #1
#85 (2,2',3,4,4')		*I <620.	NG/G #1
#136 (2,2',3,3',6,6')		*I <310.	NG/G #1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	720.	NG/G #1
#82 (2,2',3,3',4)	+	45.	NG/G #1
#151 (2,2',3,5,5',6)	+	25.	NG/G #1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	41.	NG/G #1
#149 (2,2',3,4',5',6)	+	220.	NG/G #1
#118 (2,3',4,4',5)	+	400.	NG/G #1
#146 (2,2',3,4',5,5')	+	99.	NG/G #1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	520.	NG/G #1
#141 (2,2',3,4,5,5')	+	27.	NG/G #1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <23.	NG/G #1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	460.	NG/G #1
#178 (2,2',3,3',5,5',6)	+	15.	NG/G #1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	60.	NG/G #1
#183 (2,2',3,4,4',5',6)	+	28.	NG/G #1
#185 (2,2',3,4,5,5',6)		**	NG/G #1
#174 (2,2',3,3',4,5,6')	+	25.	NG/G #1
#177 (2,2',3,3',4',5,6)	+	29.	NG/G #1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	17.	NG/G #1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	14.	NG/G #1
#180 (2,2',3,4,4',5,5')	+	92.	NG/G #1
#199 (2,2',3,3',4,5,6,6')		*I <24.	NG/G #1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <84.	NG/G #1
#201 (2,2',3,3',4,5,5',6)	+	26.	NG/G #1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	29.	NG/G #1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	14.	NG/G #1
#194 (2,2',3,3',4,4',5,5')	+	12.	NG/G #1
#206 (2,2',3,3',4,4',5,5',6)	+	5.7	NG/G #1
#128 (2,2',3,3',4,4')	+	67.	NG/G #1
#167 (2,3',4,4',5,5')	+	17.	NG/G #1

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	27.	NG/G
#123	+	18.	NG/G
#105	+	210.	NG/G
#126		<1.0	NG/G
#156	+	64.	NG/G
#157		*I <12.	NG/G #2
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003046, Field # 98094

Remark #1: SEE OI003046.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003046

--- OI003046.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003046.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#33 of 40 on 08/17/98, unseen)

Id: Point/Well/..: Field #: 98095 Route: WM00
Collection Date: 06/11/97 Time: 00:00 County: 60 (Sheboygan)
From: RW11B
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003047 Reported: 08/14/98

1D

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')		**	NG/G #1
#19 (2,2',6)		**	NG/G #1
#18 (2,2',5)		**	NG/G #1
#17 (2,2',4)	+	9.1	NG/G #1
#24/27 (2,3,6/2,3',6)	+	4.9	NG/G #1
#16/32 (2,2',3/2,4',6)	+	14.	NG/G #1
#26 (2,3',5)		*I <7.6	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	470.	NG/G #1
#33 (2',3,4)	+	20.	NG/G #1
#22 (2,3,4')		**	NG/G #1
#45 (2,2',3,6)		**	NG/G #1
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	250.	NG/G #1
#49 (2,2',4,5')	+	220.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	680.	NG/G #1
#44 (2,2',3,5')	+	37.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	29.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	120.	NG/G #1
#40 (2,2',3,3')		*I <1.6	NG/G #1
#74 (2,4,4',5)	+	210.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	130.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	640.	NG/G #1
#91 (2,2',3,4',6)	+	91.	NG/G #1
#56/60 (2,3,3',4'/2,3,4,4')	+	130.	NG/G #1
#84/92 (2,2',3,3',6/2,2',3,5,5')		*I <32.	NG/G #1
#101 (2,2',4,5,5')	+	190.	NG/G #1
#99 (2,2',4,4',5)	+	210.	NG/G #1
#97 (2,2',3',4,5)	+	26.	NG/G #1

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003047, Field # 98095

#87 (2,2',3,4,5')	+	57.	NG/G	#1
#85 (2,2',3,4,4')		*I <160.	NG/G	#1
#136 (2,2',3,3',6,6')		*I <120.	NG/G	#1
#77/110 (3,3',4,4'/2,3,3',4',6)	+	220.	NG/G	#1
#82 (2,2',3,3',4)	+	5.4	NG/G	#1
#151 (2,2',3,5,5',6)	+	14.	NG/G	#1
#135/144 (2,2',3,3',5,6'/2,2',3,4,5',6)	+	14.	NG/G	#1
#149 (2,2',3,4',5',6)	+	74.	NG/G	#1
#118 (2,3',4,4',5)	+	260.	NG/G	#1
#146 (2,2',3,4',5,5')	+	36.	NG/G	#1
#132/153 (2,2',3,3',4,6'/2,2',4,4',5,5')	+	200.	NG/G	#1
#141 (2,2',3,4,5,5')	+	11.	NG/G	#1
#137/176 (2,2',3,4,4',5/2,2',3,3',4,6,6')		*I <11.	NG/G	#1
#138/163 (2,2',3,4,4',5'/2,3,3',4',5,6)	+	180.	NG/G	#1
#178 (2,2',3,3',5,5',6)	+	5.0	NG/G	#1
#182/187 (2,2',3,4,4',5,6'/2,2',3,4',5,5',6)	+	20.	NG/G	#1
#183 (2,2',3,4,4',5',6)	+	11.	NG/G	#1
#185 (2,2',3,4,5,5',6)		**	NG/G	#1
#174 (2,2',3,3',4,5,6')	+	8.0	NG/G	#1
#177 (2,2',3,3',4',5,6)	+	11.	NG/G	#1
#171/202 (2,2',3,3',4,4',6/2,2',3,3',5,5',6,6')	+	7.6	NG/G	#1
#172/197 (2,2',3,3',4,5,5'/2,2',3,3',4,4',6,6')	+	5.6	NG/G	#1
detected between 1.8 (LOD) and 5.9 (LOQ) NG/G				
#180 (2,2',3,4,4',5,5')	+	33.	NG/G	#1
#199 (2,2',3,3',4,5,6,6')		*I <5.7	NG/G	#1
#170/190 (2,2',3,3',4,4',5/2,3,3',4,4',5,6)		*I <79.	NG/G	#1
#201 (2,2',3,3',4,5,5',6)	+	8.6	NG/G	#1
#196/203 (2,2',3,3',4,4',5,6'/2,2',3,4,4',5,5',6)	+	11.	NG/G	#1
#195/208(2,2',3,3',4,4',5,6/2,2',3,3',4,5,5',6,6')	+	6.5	NG/G	#1
detected between 2.0 (LOD) and 6.6 (LOQ) NG/G				
#194 (2,2',3,3',4,4',5,5')	+	5.9	NG/G	#1
#206 (2,2',3,3',4,4',5,5',6)	+	3.4	NG/G	#1
detected between 1.5 (LOD) and 5.0 (LOQ) NG/G				
#128 (2,2',3,3',4,4')	+	40.	NG/G	#1
#167 (2,3',4,4',5,5')	+	8.6	NG/G	#1
---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC				
#77	+	18.	NG/G	
#123	+	8.4	NG/G	
#105	+	140.	NG/G	
#126		<1.0	NG/G	
#156	+	23.	NG/G	
#157		*I <5.1	NG/G	#2
#169		<1.0	NG/G	

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003047, Field # 98095

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003047.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003047

--- OI003047.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003047.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
Organic chemistry (#37 of 40 on 08/17/98, unseen)

Id: Point/Well/..: Field #: 98096 Route: WM00
Collection Date: 06/23/97 Time: 00:00 County: 60 (Sheboygan)
From: RW6
Description: SWALLOW
To: KATHY PATNODE - DNR
GEF II - WM/4
MADISON
Source: Tissue
Account number: WM001 Collected by:
Date Received: 06/11/98 Labslip #: OI003048 Reported: 08/14/98

Comment: Y

TISSUE SAMPLE PREPARATION		C	
---- test: CONGENER ANALYSIS IN TISSUE - 1410			
#7 (2,4)		**	NG/G #1
#6 (2,3')		**	NG/G #1
#5/8 (2,3/2,4')	+	10.	NG/G #1
detected between 4.0 (LOD) and 13. (LOQ) NG/G			
#19 (2,2',6)		*I <2.5	NG/G #1
#18 (2,2',5)	+	3.7	NG/G #1
#17 (2,2',4)	+	13.	NG/G #1
#24/27 (2,3,6/2,3',6)	+	2.5	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#16/32 (2,2',3/2,4',6)	+	6.6	NG/G #1
#26 (2,3',5)		*I <3.4	NG/G #1
#28/31 (2,4,4'/2,4',5)	+	68.	NG/G #1
#33 (2',3,4)	+	6.9	NG/G #1
#22 (2,3,4')	+	2.5	NG/G #1
detected between 1.2 (LOD) and 4.0 (LOQ) NG/G			
#45 (2,2',3,6)	+	1.9	NG/G #1
detected between 0.80 (LOD) and 2.6 (LOQ) NG/G			
#46 (2,2',3,6')		**	NG/G #1
#52 (2,2',5,5')	+	44.	NG/G #1
#49 (2,2',4,5')	+	38.	NG/G #1
#47/48 (2,2',4,4'/2,2',4,5)	+	62.	NG/G #1
#44 (2,2',3,5')	+	19.	NG/G #1
#37/42 (3,4,4'/2,2',3,4')	+	16.	NG/G #1
#41/64/71 (2,2',3,4/2,3,4',6/2,3',4',6)	+	31.	NG/G #1
#40 (2,2',3,3')	+	2.3	NG/G #1
detected between 1.0 (LOD) and 3.3 (LOQ) NG/G			
#74 (2,4,4',5)	+	33.	NG/G #1
#70/76 (2,3',4',5/2',3,4,5)	+	34.	NG/G #1
#66/95 (2,3',4,4'/2,2',3,5',6)	+	110.	NG/G #1
#91 (2,2',3,4',6)	+	13.	NG/G #1

State Laboratory of Hygiene
University of Wisconsin Center for Health Sciences
465 Henry Mall, Madison, WI 53706
R.H. Laessig, Ph.D., Director S.L. Inhorn, M.D., Medical Director

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Environmental Science Section (608) 262-2797 DNR LAB ID 113133790
... continuing Labslip # OI003048, Field # 98096

#128 (2,2',3,3',4,4')	+	7.7	NG/G #1
#167 (2,3',4,4',5,5')	+	2.6	NG/G #1

detected between 1.8 (LOD) and 5.9 (LOQ) NG/G

---- test: TOXIC PCB CONGENERS IN TISSUE BY "HEART CUTTING"GC

#77	+	3.4	NG/G
#123	+	1.8	NG/G
#105	+	24.	NG/G
#126		<1.0	NG/G
#156	+	7.6	NG/G
#157		*I <2.1	NG/G #2
#169		<1.0	NG/G

--- Footnotes ---
+: Positive results are prefixed by a plus sign.

Remark #1: SEE OI003048.MM1
Remark #2: INTERFERENCE INDICATED BY *I.

Memo for OI003048

--- OI003048.MM1 - CONGENER ANALYSIS IN TISSUE - 1410 ---

The following qualifiers exist for the data that is reported for Wisconsin State Laboratory of Hygiene sample OI003048.

LOD not achievable due to dilution indicated by **.
Interference indicated by *I.

If you have any questions, contact David Degenhardt at (608) 262-2797.

Dale

Andrea Seeley
June 10, 1993

INTERNSHIP PROJECT OUTLINE

TITLE: Small mammal populations along PCB contaminated sections of the Sheboygan River, Wisconsin

DESCRIPTION OF PROJECT

Small mammals, primarily mice, voles, shrews, chipmunks and possibly squirrels will be live trapped along sections of the Sheboygan river shoreline. Trapping will try to favor animals near the river assuming those nearest the river are those most greatly affected by PCB contamination in the river. The river has been contaminated by PCB runoff from the Tecumseh Products Diecasting Plant in Sheboygan Falls and the Kohler Co. landfill in Kohler. Although cleanup efforts have begun (both qualify as Superfund sites), the landfill still leaches PCB's and there are PCB's tied up in the sediments of the river.

OBJECTIVES OF PROJECT

The primary objective is to determine what species of small mammals are along the river and each species abundance. Some specimans will be collected for necropsy to analyze for toxics in their tissues.

APPLICATION - where and how it will be used by the agency

This small mammal study is one part of a larger biomonitoring project for the Sheboygan River Area of Concern. The project was designed to determine the effects and monitor the concentrations of PCB contamination on river wildlife. This year's trapping effort will help set the stage for more selective trapping for toxicology and histopathology work next year. This mammal study will give the project coordinators an idea of occurence and abundance of small mammals to allow selective capture of mammals for biomonitoring in the future. Specimans taken and analyzed will show possible levels of PCB's in the food chain and will add to the biomonitoring information. The entire project, when completed, will be used to determine results of cleanup efforts on the river.

TYPE OF SUPPORTIVE LITERATURE TO BE USED

1. High PCB residues in birds from the Sheboygan River, Wisconsin. (paper)
2. Capture-Recapture and Removal Methods for Sampling Closed Populations (manual)
3. Wildlife Techniques Manual
4. Sheboygan Wildlife Monitoring Proposal
5. "Kohler landfill assessed again" (newspaper)
6. Environmental Contaminant Monitoring of Wisconsin Wild Game (report)
7. A paper on differences in Townsend's chipmunk populations

METHOD AND MATERIAL TO BE USED

Sherman and Tomahawk live traps will be set in 1-3 sites along the river near Kohler and at 1-2 control sites that are not contaminated. The only

larger mammal that will be actively sought is mink because of their close association with the river and documented effects of PCB's on them. Traps will be set in pairs on line transects along the shoreline. Traps will be within 1-10m of the shoreline. They will be baited with peanut butter and oatmeal. Separate mink sets will be put out and designed to exclude as much of the raccoon population as possible. Depending on trapping success, the trapline on the study area will be moved to different portions of the river to document small mammal popultions over a larger area.

Because raccoons are disrupting the study area trapline and may interfere with mink traps, raccoons may be trapped and sacrificed for necropsy. All animals that die accidentally will also be preserved for necropsy. PCB analysis will be done on the brain, kidney, liver and possibly the carcass if the animal is one that might be consumed by humans.

Small mammals will be marked for recapture using combinations of dyes and toe clipping. Some mammals will be kept in captivity to determine dye longevity and how well it works as a marking method.

EXPECTED RESULTS

It is expected that species and their numbers will not differ significantly between the control and study areas. It is expected that significant PCB levels, if found in mammals at all, will be higher in animals close to the aquatic food chain and at a higher trophic level (e.g. higher in mink than in mice). If mammal populations differ between control and study areas, the greatest difference will be among mammals closely associated with the river. For example, if mink are found, it is expected that there will be more found in the uncontaminated control area than in the contaminated study area. It is suspected that mink may be hard to trap due to either low numbers or a high raccoon population or both.

From: DNRVAX::PATNOK "Kathy Patnode, WM/4, 608-267-7974" 3-APR-1995
To: PLYMOU::KATSMD
CC:
Subj: RE: Sheb River

Here's the make-shift key to understanding these analysis records:

* and a value = interference in the assay (don't put a lot of emphasis on this number as it may be a combination of contaminants)

** in a metals column= not enough tissue sample was available, so metals assay not run

** in PCB total column = unable to match to commercial PCB pattern. We are finding that for most mammalian livers, metabolism of PCBs leads to a pattern that can't be matched to commmercial mixtures. The result is that the lab can't determine a total PCB value and congeners must be quantified.

columns (26-206) = PCB congener concentrations. Please note:
congener sums are in ng/g and PCB totals are in ug/g. I am trying to decide how to make comparisons between total and sum of congeners, but in this case it is more a matter of having detectable PCBs or not.

Hope this info. helps. If you have any more questions, let me know.

Rochester Park should definitely be included because of the available water and sediment data. This is easiest for turtles and mudpuppies, so plan for those. If you have extra nesting boxes and Randy could monitor yet another site without a major hassle, go ahead with the swallows too.

I got the mudpuppy sampling info from Canadians. I will copy it and send it off to you today so you and Randy can look at it.

The decision on the waterfowl is that the data is not meaningful due to their mobility. The goal is to get the Animal Care and Use Committee in place first and then propose to periodically (every 5 years) use sentinel ducks to assess the contaminant uptake for each AOC. We are pushing legal services pretty hard to convince the administration that we are violating the Animal Welfare Act, so hopefully the Committee can be established and maybe 1996 will be a duck study year. I'll keep you posted.

I will shoot for the 3rd or 4th week of the month for coming down. Good luck with the gobblers.

SPECIES	DNR ID	LOCATION	WT	SEX	%FAT	PCB	26	28	52	49	47	44	41	74	70	66	56	84	101	99	97
SOREX	94081	CONTROL 1	4.33	B	4.4	<0.04															
SOREX	94082	CONTROL 1	3.25	B	3.8	<0.04															
BLARINA	94083	CONTROL 1	16		1.9	0.051															
PEROMYSCUS	94084	CONTROL 1	21		3.8	<0.04															
PEROMYSCUS	94085	CONTROL 1	27		4.4	<0.04															
CLETHRINOMYS	94086	RIVER WILDLIFE	46	F	2.5	0.20															
CLETHRINOMYS	94087	RIVER WILDLIFE	46	F	2.5	0.29															
CLETHRINOMYS	94088	RIVER WILDLIFE	22	F	1.3	**		5.6			2.6			17		13	3.6		0.91	2.1	
MICROTUS	94089	RIVER WILDLIFE	51	F	2.1	<0.04															
MICROTUS	94090	RIVER WILDLIFE	28	M	2.3	**		14	1.4	0.87	10			12	6.2	34	8.7		6.1	21	1
MICROTUS	94091	RIVER WILDLIFE	13		1.8	0.33															
PEROMYSCUS	94092	RIVER WILDLIFE	27	F	4.2	**		12	4.9	2.1	34		3.4	12		20	6.2	4.2	5.7	63	
PEROMYSCUS	94093	RIVER WILDLIFE	26	M	4.1	**		24	2.8	0.78	33		2.7	29		24	11		6.8	45	
PEROMYSCUS	94094	RIVER WILDLIFE	18	M	2.4	**		13	1.5		17			16		13	5.7		3.6	24	
PEROMYSCUS	94095	RIVER WILDLIFE	22	M	3.1	**					4.8			3.4		2.8			1.3	9.7	
ZAPUS	94096	RIVER WILDLIFE	13	M	1.6	**					2								0.7	2.3	
ZAPUS	94097	RIVER WILDLIFE	23	F	3.1	0.098															
TAMIAS	94098	RIVER WILDLIFE	88	M	1.3	1.0															
TAMIAS	94099	RIVER WILDLIFE	94	F	1.7	**					2			1.7		4.5				6.9	
MICROTUS	94100	COUNTY A	22	M	2.8	0.072															
MICROTUS	94101	COUNTY A	43	F	4.7	**	0.96	110	8.1	5	50	1.4	11	53	48	140	47		15	32	2.7
PEROMYSCUS	94102	COUNTY A	22	M	0.8	**					6.3			1.4					1.1	19	
PEROMYSCUS	94103	COUNTY A	18	M	3.5	**					1.5			3.1		3.2			1.3	4.8	
PEROMYSCUS	94104	COUNTY A	20	M	2.2	0.50															
TAMIAS	94105	COUNTY A	51	M	1	**		5.4			8.7			36		6.1	11			27	
TAMIAS	94106	COUNTY A	106	F	2.5	**		18	2	1.3	27			30	3.5	35	16		2.5	25	
PEROMYSCUS	94107	CONTROL 2	23	M	2.3	<0.04															
PEROMYSCUS	94108	CONTROL 2	23	F	2.3	<0.04															
PEROMYSCUS	94109	CONTROL 2	22	M	2.6	<0.04															
PEROMYSCUS	94110	CONTROL 2	18	M	4.2	<0.04															
PEROMYSCUS	94111	CONTROL 2	19	M	4.2	<0.04															
MICROTUS	94112	CONTROL 2	35	M	2.5	<0.04															
MICROTUS	94113	CONTROL 2	44	M	2.7	<0.04															
ZAPUS	94115	CONTROL 2	12	B	2.9	<0.04															
SOREX	94116	CONTROL 2	4.33	B	2.5	<0.04															
CLETHRINOMYS	94117	CONTROL 2	15		3.1	<0.04															
CLETHRINOMYS	94118	CONTROL 2	12		3.8	<0.04															
CLETHRINOMYS	94120	CONTROL 2	11		4	<0.04															

87	85	77	149	118	146	132	138	178	182	183	177	172	180	170	201	196	194	206
				51	5.2	1.9	17	1.3	4.1		1.8		7.8	8.1	2.3		1.3	
1.5		4.5	1.6	52	6.7	27	35		3.8		2.4		6.5	9.1				
2.5	8.8	2.7	1.6	33	19	180	140	3.2	23	4.7	1.2	5	46	46	9.2	17	7.8	4.5
2.3	7.1	1.9	1.2	120	22	180	140	4.8	32	5.5	2.6	5.1	59	45	9.7	17	9.2	4.4
1.2	3.8			61	11	92	72	2.5	16	2.8	1.3	2.7	31	23	4.9	8.3	4.7	2.3
				20	6.3	110	71	1.5	26	3.7		3.4	63	42	12	23	9.3	4.7
				18	9.9	110	67	1.4	23	3.1			59	36	3.8	15	6.9	2.5
				10	2.6	28	20		2.4				10	10		3.3	2.4	1.7
7	13	13		97	8.3	16	38		4.4		2.2		8	9.5	2.1		1.1	
	2.4			19	14	160	120	3.6	33	5.1	1.1	5	68	51	14	22	11	5.4
				28	7.7	43	34	1.8	14			2.1	12	9.2	3.3	3.1	1.9	
1.9	4			59	2.3	42	33		1.9				7	7.6			1.1	
2.1	8.7	2.4		37		27	21						5.7	6.5				

September 17, 1993
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218 Sims
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SMALL MAMMAL POPULATIONS ALONG PCB CONTAMINATED SECTIONS OF THE SHEBOYGAN RIVER, WISCONSIN

ANDREA L. SEELEY, College of Natural Resources, University of Wisconsin, Stevens Point, Wisconsin, 54481

Abstract: In 1978, the Sheboygan River was discovered to be contaminated by PCBs (Polychlorinated biphenols), volatile organic compounds and heavy metals. Since wildlife along the river are potentially affected by these contaminants, a biomonitoring project was developed to study the effects of PCB contamination on riparian wildlife. As part of this project, small mammals along polluted sections of the river were live trapped to determine species occurrence and abundance. Specimens were collected for contaminant analysis. Deer mice (Peromyscus maniculatus), meadow voles (Microtus pennsylvanicus) and Eastern chipmunks (Tamias striatus) were most frequently captured. Data on abundance and occurrence along with current levels of contaminant loads will allow selective capture of mammals for future biomonitoring. Information on PCB levels in terrestrial mammals will help clarify the effects of PCB's in the food chain.

Results of this study will be used as part of the biomonitoring project of cleanup efforts on the river.

Key Words: Sheboygan River, PCBs, small mammals, biomonitoring, deer mice, *Peromyscus*, voles, *Microtus pennsylvanicus*, chipmunks, *Tamias striatus*, populations

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PCB contamination of fish in the Sheboygan River, Wisconsin was first documented in 1978 (Kleinert *et al.* 1978). Forty samples of fish contained an average of 155 ppm PCBs on a wet weight basis and some carp (Cyprinus carpio) had hundreds of ppm PCBs. In 1983, bird carcasses contained from 23 to 218 ppm PCBs and brain tissue of one great blue heron contained 220 ppm (Heinz *et al.* 1983). Four out of 5 belted kingfisher (Ceryle alcyon) carcasses had over 180 ppm PCBs. The residues found in the birds were at levels considered harmful to some species tested in the laboratory.

The primary source of the PCBs was the Tecumseh Products Diecasting Plant in Sheboygan Falls (Kleinert *et al.* 1978). Deposits of granular oil absorbent material behind the plant leached PCBs into the adjacent Sheboygan River. The Kohler Co. landfill in Kohler also leached PCBs from solvents and other hazardous wastes deposited there (Wis, Div of Health, 1993). Although cleanup efforts have begun (both the plant and landfill are Superfund sites), the landfill continues to leach PCBs and there are PCBs in the sediments.

A biomonitoring project was designed to assess the effect of contamination on river wildlife. The project proposed population studies and PCB analyses of waterfowl, small mammals and reptiles and amphibians. The information gathered in the project will be used to help determine the success of cleanup efforts on the river. The small mammal study is the first part of the study to be undertaken. The primary objective of this study was to determine what species occurred along the river and their abundance. Control areas were selected upstream of the contaminated area to compare species composition of contaminated to non-contaminated areas. Some specimens were collected for necropsy and to analyze their tissues for toxics.

We would like to thank F. Wedepohl, the River Wildlife Reserve and Sheboygan County for the use of their land. R. Hetzal gave advice on trapping and assisted with trapline establishment. Specimens will be analyzed by S. Hurley and B. Bodenstein.

STUDY AREAS

Samples were taken from 3 sections of the Sheboygan River shoreline near Kohler, Wisconsin (hereafter referred to as "Lodge", "CoA" and "Oxbow") and from 2 control areas upriver from Sheboygan Falls (hereafter referred to as "C1" and "C2") (Fig.1). Vegetation at the study areas consisted of reed canary grass (Phalaris arundinacea), Phlox spp., stinging nettle (Urtica dioica), mayapple (Podophyllum peltatum), birch (Betula spp.) box elder (Acer negundo) and trembling aspen (Populus tremuloides) (Fig. 2-4). The banks of the river were steep and well vegetated

and with occasional mudflats extending into the river. The control areas were grassland with scattered trees Reed canary grass was the dominant ground cover. Clover (Trifolium spp.) were also abundant. Trees consisted of box elder (Acer negundo), willow (Salix spp.) and cottonwood (Populus deltoides). The banks were less steep than the study areas and had few mudflats. The soil type of both control areas was a Matherton silt loam (0-3 percent slope) and that of all study areas was a Bellevue fine sandy loam with a sandy subsoil (U.S. Dept. of Ag. 1973).

The climate consists of hot, humid summers and long, cold winters with average annual precipitation of 59.5 cm (U.S. Dept. of Ag. 1973). Storms are common in all seasons. Weather during the trapping period was wetter than normal. Storms kept the Sheboygan River high for most of June and July. When the river flooded, it rose 1 to 2 m up the bank. Temperatures were normal for summer, with an average of 27 C.

METHODS

The trapping period ran from 31 May 1993 to 20 Aug 1993. Each of the 3 study areas were trapped for 4 weeks as were the 2 control areas. Thirty to 35 small Sherman and Tomahawk live traps were set in pairs or trios on linear transects on one or both sides of the river. Trap stations were 15 m apart and were within 10 m of the river. Peanut butter and oatmeal were used for bait. Because raccoons (Procyon lotor) were interfering with the traplines, Sherman traps were placed inside large

Tomahawk traps. Medium-sized Tomahawk traps were placed at some stations to accomodate squirrels (Sciurus spp.)

Traplines were open Monday night through Thursday night. They were checked from 0800 to 1200 hours Tuesday through Friday. Mammals were marked for recapture with combinations of black hair dye and toe clipping. Several deer mice (Peromyscus maniculatus) and meadow voles (Microtus pennsylvanicus) were kept in captivity to test the longevity of the dye.

After live traps were removed from an area, rat and mouse snap traps were set to obtain data for a second population estimate. Traps were set at 5 or 6 stations where the most animals had been previously caught in live traps. The traps were operated for 1 or 2 weeks depending on trap success.

Traps were also set for mink (Mustela vison) because of their sensitivity to low levels of PCBs (Aulerich and Ringer 1977). Conibear traps were set into holes dug in the river bank and baited with mink lure. Mink sets were located at areas of good mink habitat or areas where mink had been sighted or where there was mink sign.

Specimens that died in the traps were collected for necropsy and PCB analysis on the brain, kidney and liver and, if the animal was one that might be consumed by humans, the carcass. Analysis of whole carcasses will be done by skinning and grinding up the carcass and analyzing the slurry.

too small to calculate population estimates for other species. Subjective evaluation of capture frequencies and population estimates were made and possible reasons for differences were discussed.

One to 3 "trap-happy" animals were encountered at all sites. They did not influence total recaptures unless few animals overall were caught. Deer mice were most commonly conditioned and made up 14% - 26% of the recaptures at a site. Many Eastern chipmunks returned to traps but only one (recaptured 9 times) occured regularly.

Hair dye used as a marker worked well on mice and Eastern chipmunks. The deer mice kept in captivity held their marks for 4 weeks until released. Mice recaptured in snap traps several weeks after live trapping were still marked. Dye did not work on meadow voles or shrews due to their dark fur; toe clipping was satisfactory.

No mink were trapped at any site. Traps were occasionally sprung but no animals were caught. There were past reports of farm bred mink attacking game farm pheasants near Lodge. One set of tracks was found at C1 and questionable tracks were found at other sites. Muskrat tracks were found at C2 and Lodge.

DISCUSSION

Species composition differed between control and study sites. I believe the variation is due to habitat differences. Eastern chipmunks were not found at control sites because are primarily a grassland species. More meadow voles were found at control sites than study sites for the same reason.

Rose (1978) found meadow voles and masked shrews to be the most abundant animals trapped in 4 upland fields at the Horicon Marsh, Dodge County. In St. Croix County, a positive correlation was found between the importance values of non-grass species in fields and the number of small mammals caught (Kjolhaug 1982). Comparing species composition and cover types at the Apostle Islands National Lakeshore, Stowell (1984) found deer mice populations to be high in paper birch (Betula papyrifera) - balsam fir (Abies balsamea) associations and meadow voles to be very abundant in old fields

Habitat differences cannot explain the difference in numbers of meadow voles and masked shrews between C1 and C2. The two sites are identical in vegetation structure and are 1 mile apart and should support similar numbers of meadow voles and masked shrews. The increase in masked shrews at C2 is probably trap related. Shrews eat mice more than vegetable matter (Jackson 1961) and would not be attracted to traps baited with peanut butter until mice had been in them. The fact that masked shrews were not caught at C1 until two weeks into the trap session supports this idea. When the traps were moved to C2, they already smelled like mice and masked and short-tailed shrews were caught through the entire trapping session at C2.

The lack of meadow voles at C2 may also be trap related. Because traps were not cleaned between being moved from C1 to C2, some traps may have failed to work correctly and animals could have eaten the bait without triggering the trap. All trap

stations were used at least once at C1 but only 9 stations out of 15 were used at C2. This may indicate why there were lower numbers of animals overall at C2 (Fig. 8).

Considering the lower number of trap nights for snap traps, (544:128) snap traps caught proportionately similar numbers for all species. Frequencies per trap night may be affected by immigration from animals replacing those removed. Kjolhaug (1982) noticed 3 day cycles in the number of animals trapped ove a 10 day trapping period. He suspected that every 3 days a population would be exhausted and new animals would move in. The same reaction may have occurred here.

The fact that no mink were caught and that only one set of tracks was found in a control area suggests that mink are scarce along the Sheboygan River. Local trappers and residents along the river reported seeing very few mink over the past two decades. Tracks and scat of muskrat (Ondatra zibethica), a mink prey item, were scarce at all sites. Lack of experience in trapping mink may partially explain no mink being caught. Mink may also be limited by PCBs in the river.

MANAGEMENT IMPLICATIONS

This study is a basis for more selective sampling of the small mammal population. Deer mice, meadow voles and Eastern chipmunks would be good species to trap because of their abundance. Deer mice could be used for comparison between areas. Masked shrews are also common and, because insects are part of

their diet, may have more exposure to PCBs. Results of tissue analysis will show which species, if any, are accumulating PCBs. Contaminant analysis was not finished in time for the results to be presented here. I suggest that, a variety of mammal species from the Sheboygan River be sampled in the future, and analyzed for toxics.

For future trapping efforts, I reccommend modifications to the methods in this paper. In trapping shrews, traps should be baited with animal scent such as mouse hair or droppings. Otherwise it will take a few weeks for a trap to attract shrews. Mink traps should be set to exclude raccoons. Snap traps should be set in greater numbers and for a longer time if the only objective is to acquire specimens. Snap traps are more effective when baited with oatmeal and peanut butter rather than just peanut butter.

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7. Rose, D. Summer populations of small mammals in the Horicon Marsh Area. 1978. Intern paper. University of Wisconsin, Madison, WI. 13pp.

8. Stowell, L. 1982. Wildlife resources of the Apostle Islands National Lakeshore, an inventory and management plan. M.A. thesis. College of Natural Resources, University of Wisconsin, Stevens Point, WI. 195pp.

9. U.S. Department of Agriculture. 1978. Soil survey of Sheboygan County, Wisconsin. 119pp.

10. Wisconsin Division of Health. 1993. Public health assessment, Kohler Company Landfill, Sheboygan County, Wisconsin. 27pp.

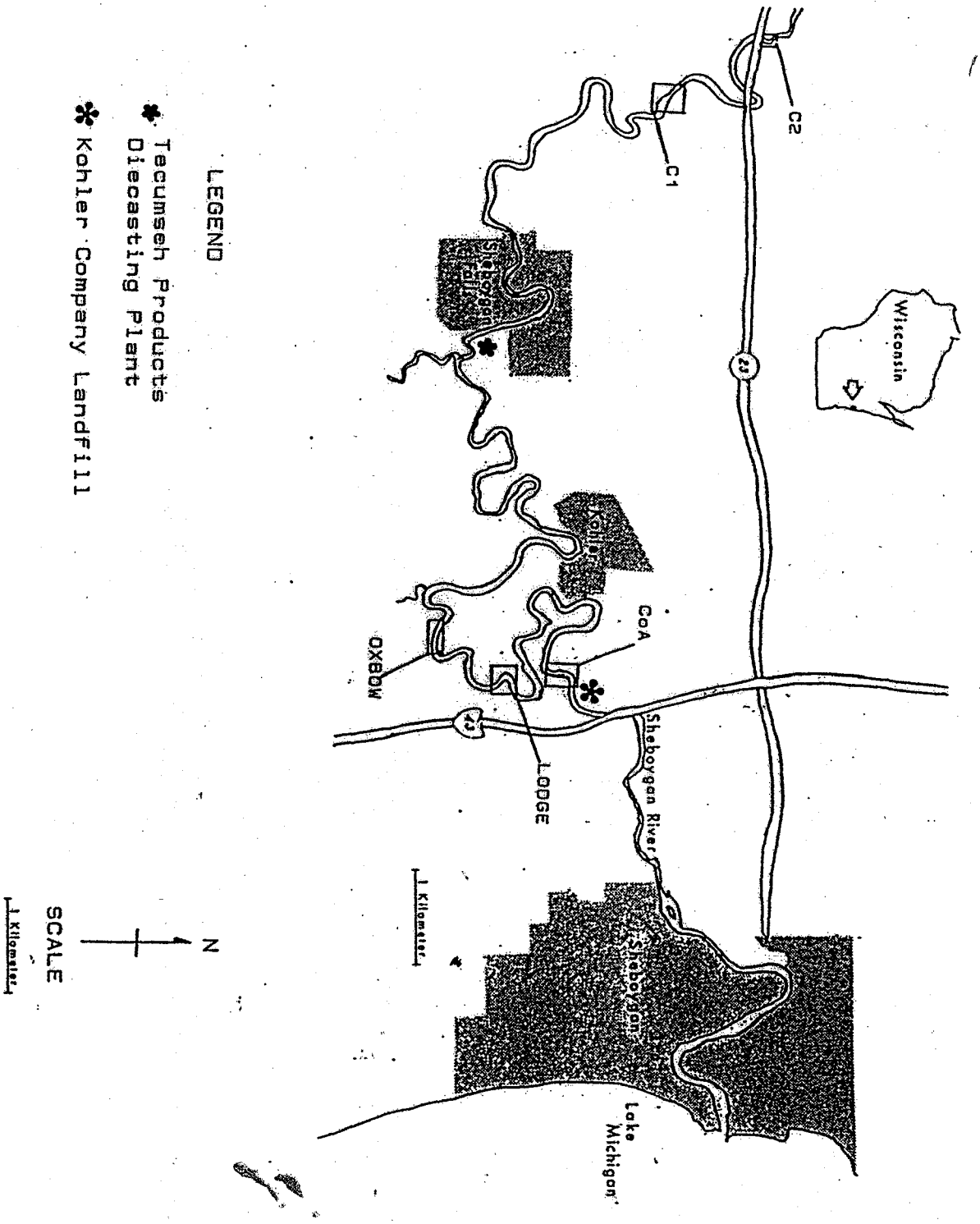
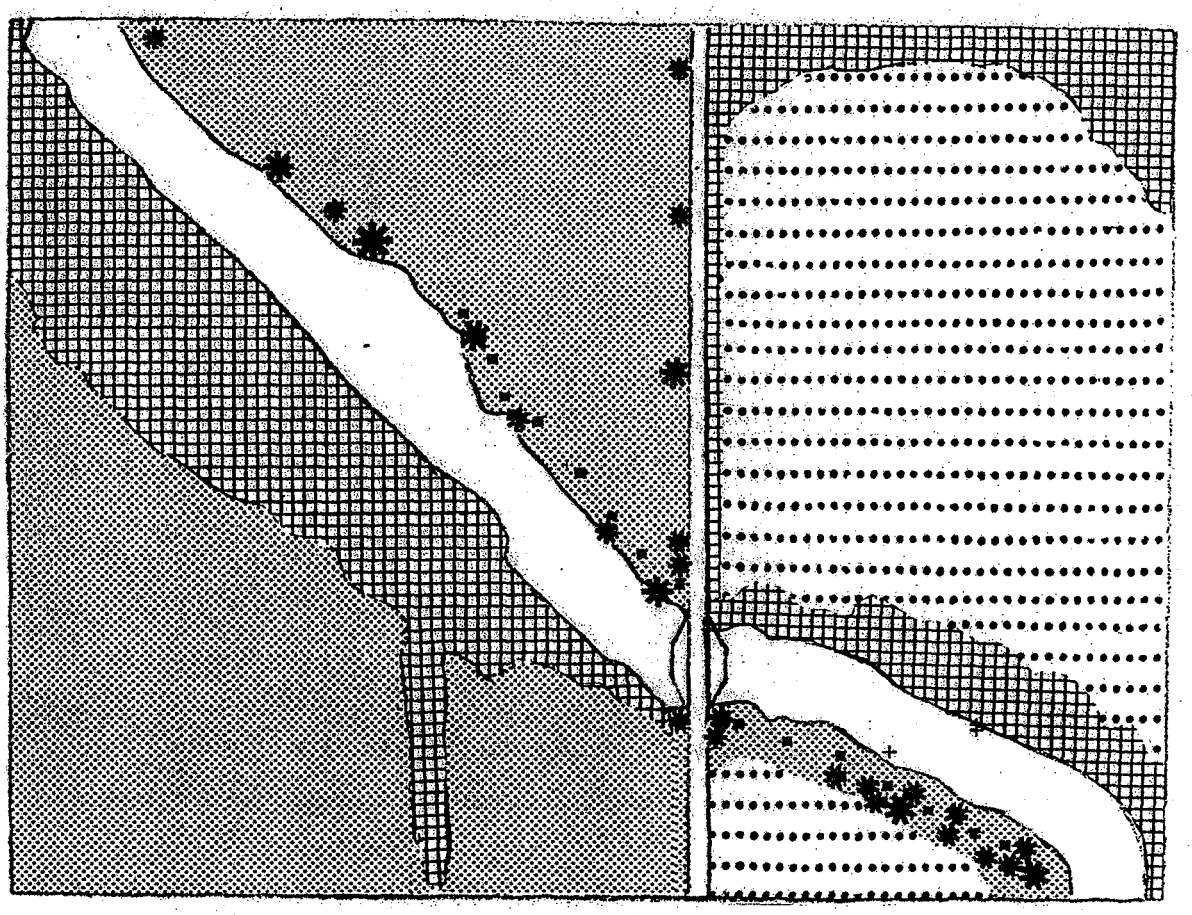


Fig. 1. Sheboygan River area with locations of the control and study areas, Sheboygan County, Wisconsin. 1993.



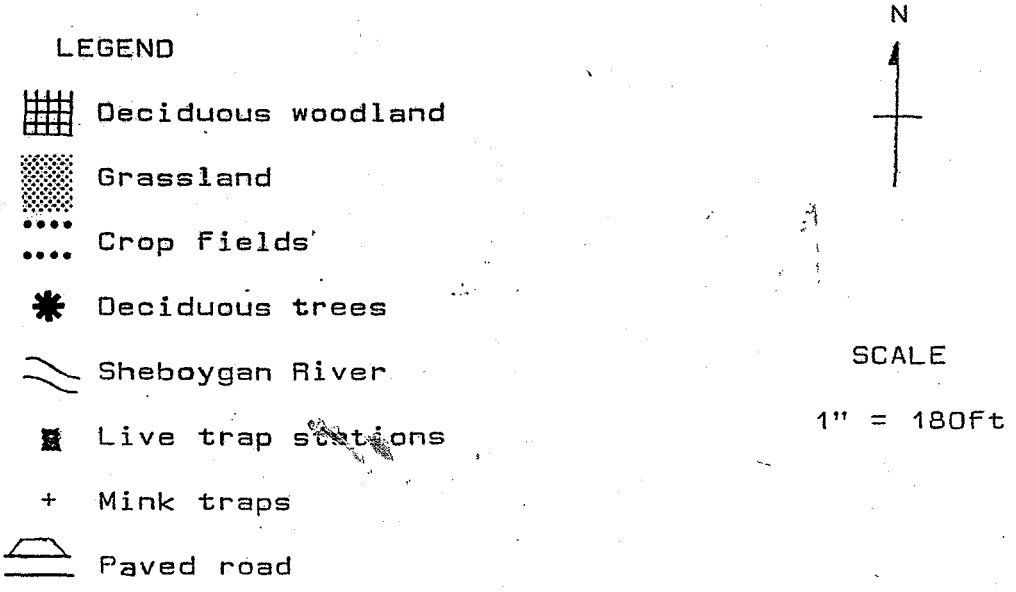
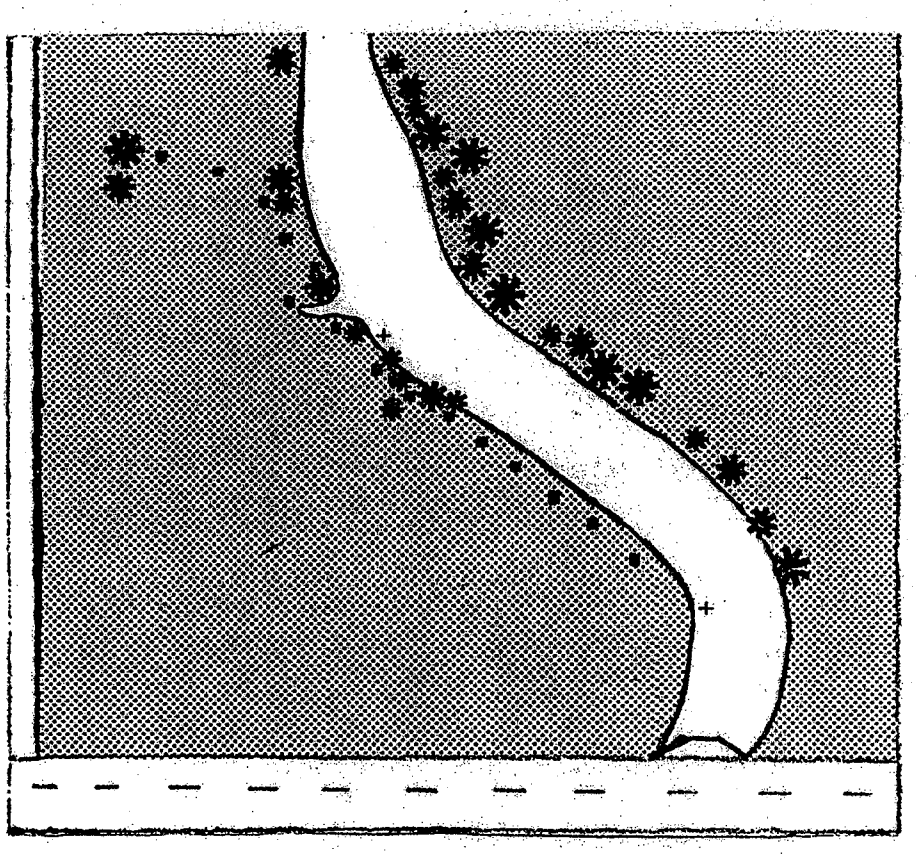


Fig. 2. Cover type map of C1; SW1/4 SW1/4 NW1/4, Sec. 26, NE1/4 SE1/4 NE1/4, Sec. 27, Sheboygan County, Wisconsin. 1993.



LEGEND

Grassland

Deciduous trees

Sheboygan River

Live trap stations

\+ Mink traps

County road

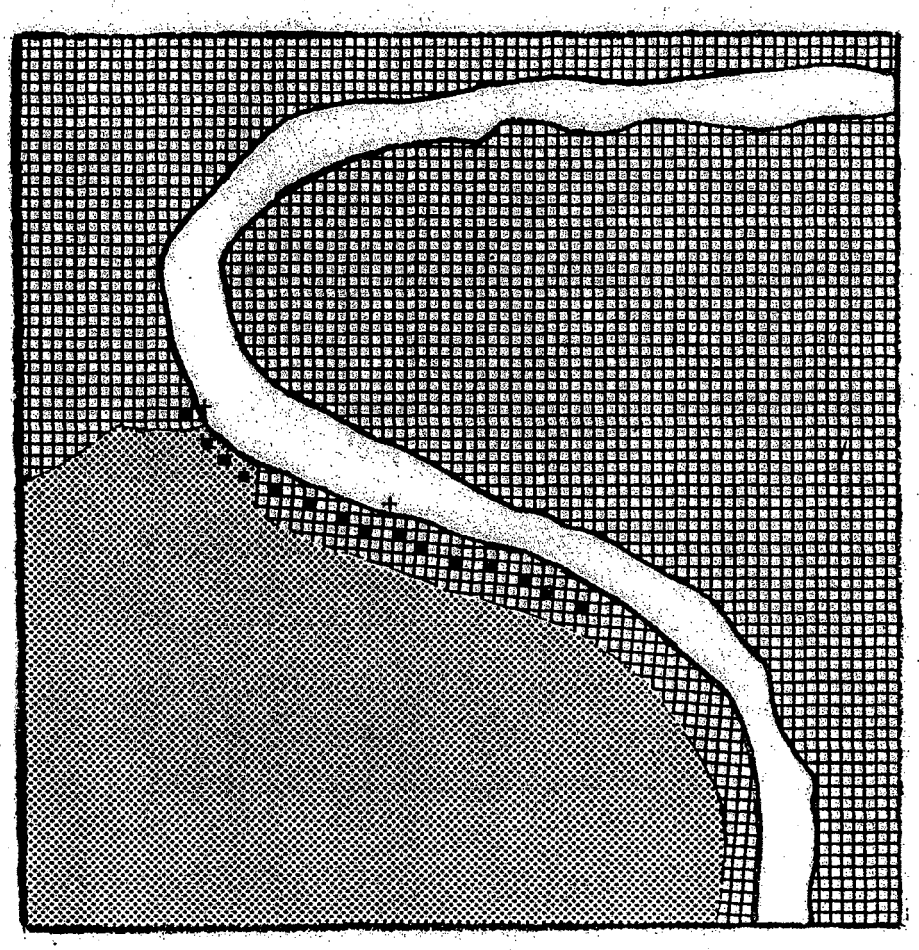
State highway 23

N

SCALE

1" = 180ft

Fig. 3. Cover type map of C2; SW1/4 NW1/4 SE1/4, Sec. 22, T.15N., R.22E., Sheboygan County, Wisconsin. 1993.



LEGEND

Deciduous woodland

Grassland

Sheboygan River

Live trap stations

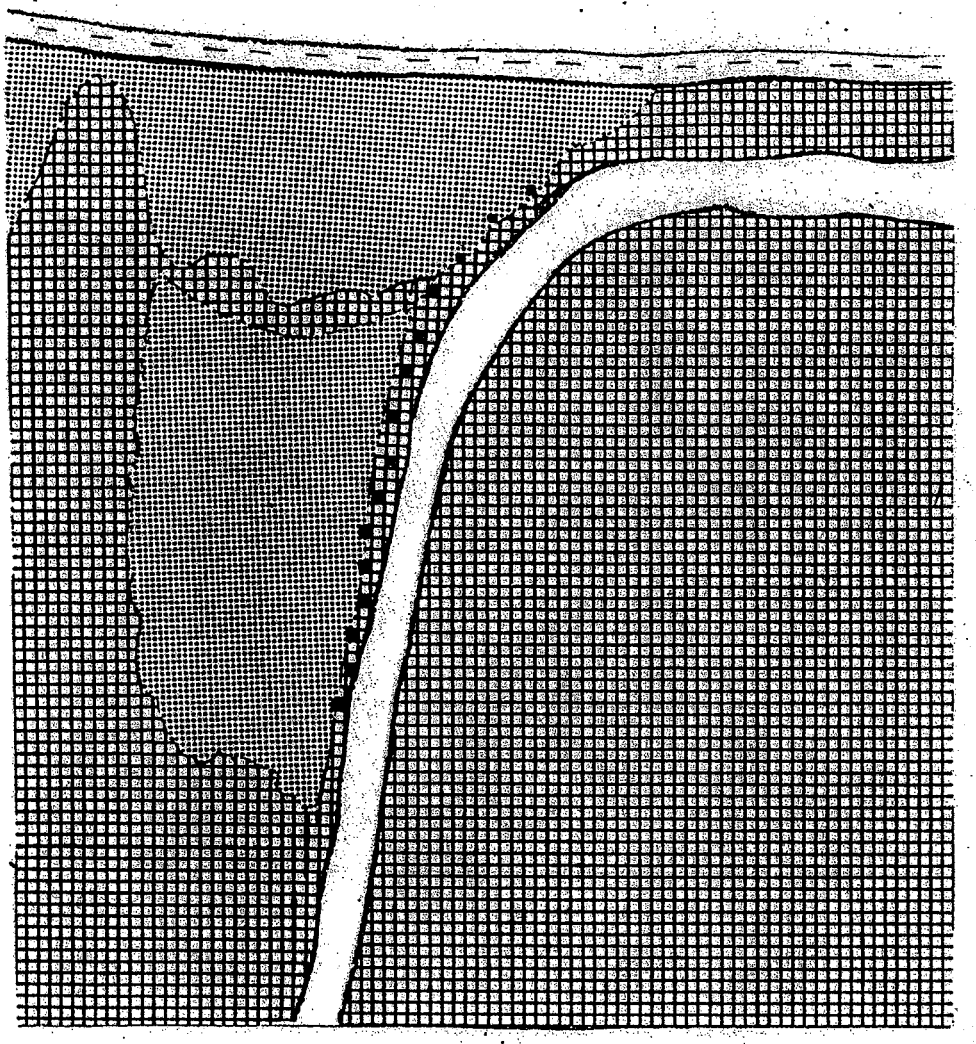
\+ Mink traps

N

SCALE

1" = 229Ft

Fig. 4. Cover type map of Lodge; S1/2 S1/2 NE1/4 and the N1/2 N1/2 SE1/4, NW1/4, Sec. 32, Sheboygan County, Wisconsin. 1993.



LEGEND

Deciduous woodland

Grassland

Sheboygan River

County

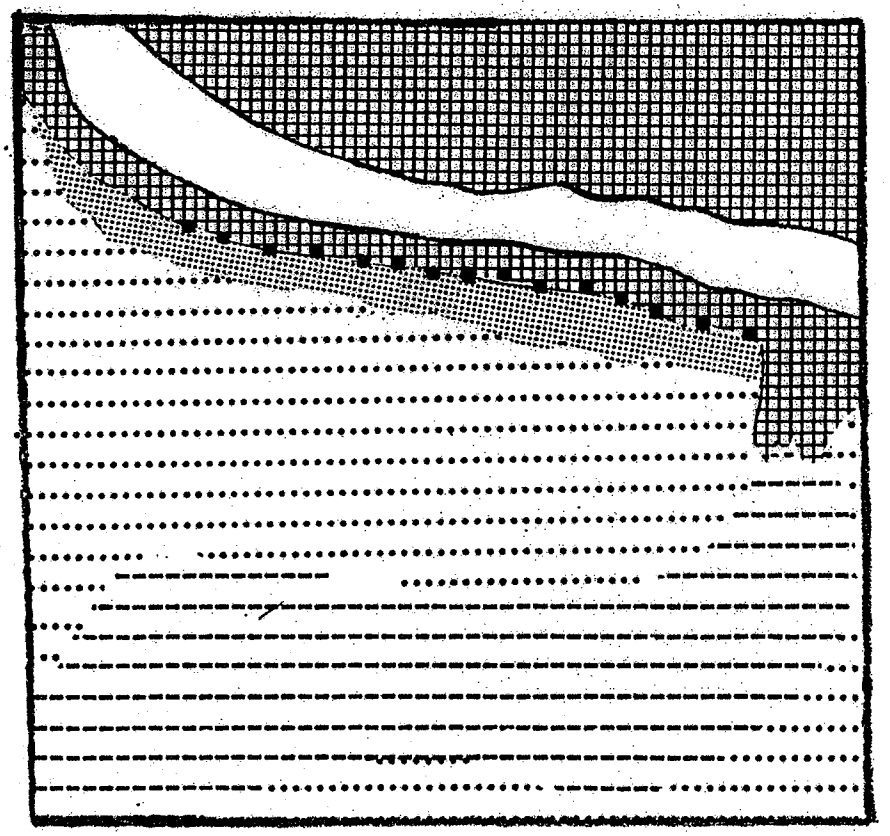
Live trap stations

N

SCALE

1" = 210Ft

Fig. 5. Cover type map of CoA; W1/2 SE1/4 SE1/4, Sec. 29, Sheboygan County, Wisconsin. 1993.



LEGEND

Deciduous woodland

Grassland

Wildlife food plot (Sorghum)

Wooded marsh

Sheboygan River

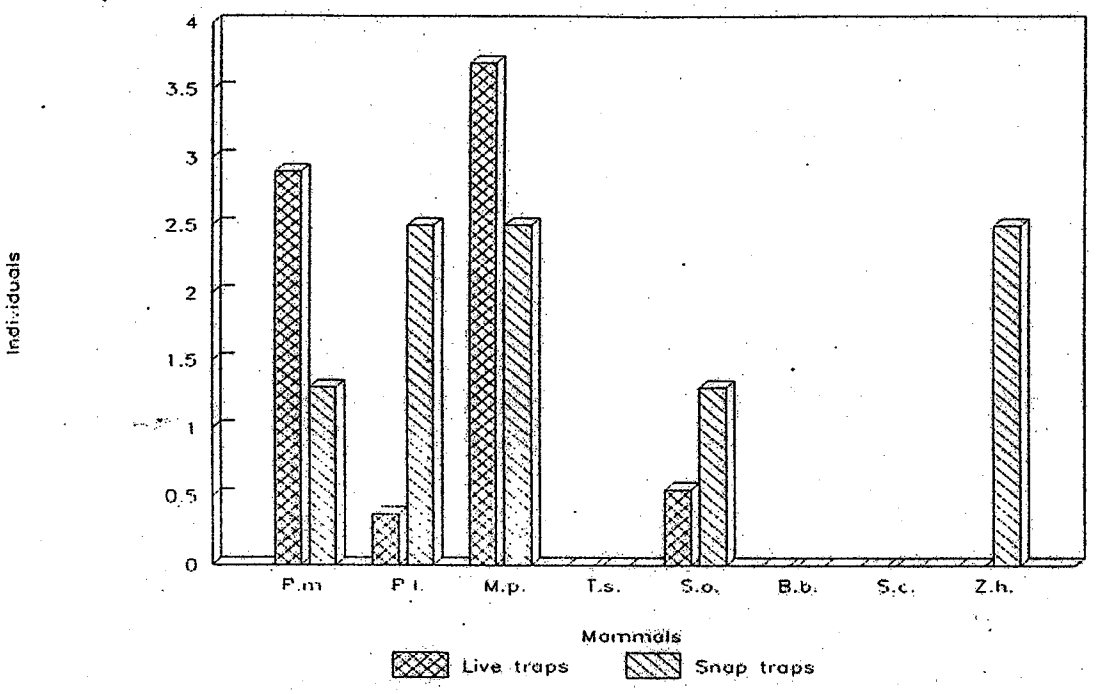
Live trap stations

N

SCALE

1" = 210ft

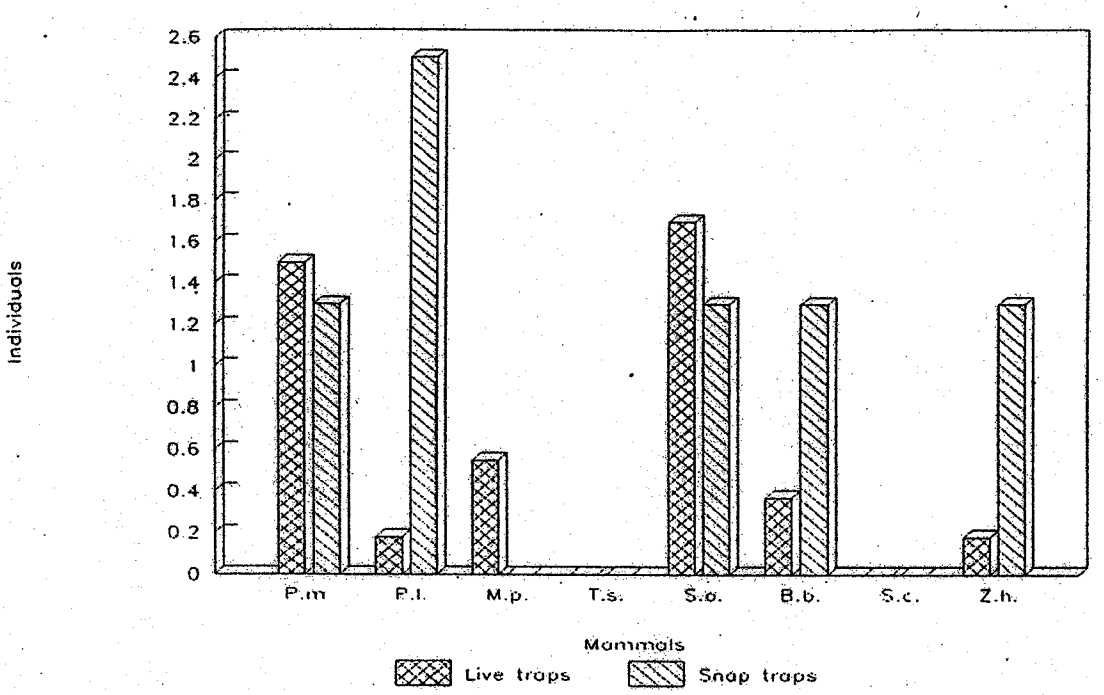
Fig. 6. Cover type map of Oxbow; SE1/4 E1/2 NE1/4 SW1/4 and the S1/2 NW1/4 SE1/4, Sec. 32, Sheboygan County, Wisconsin. 1993.



P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c. = Sciurus carolinensis; Z.h. = Zapus hudsonicus.

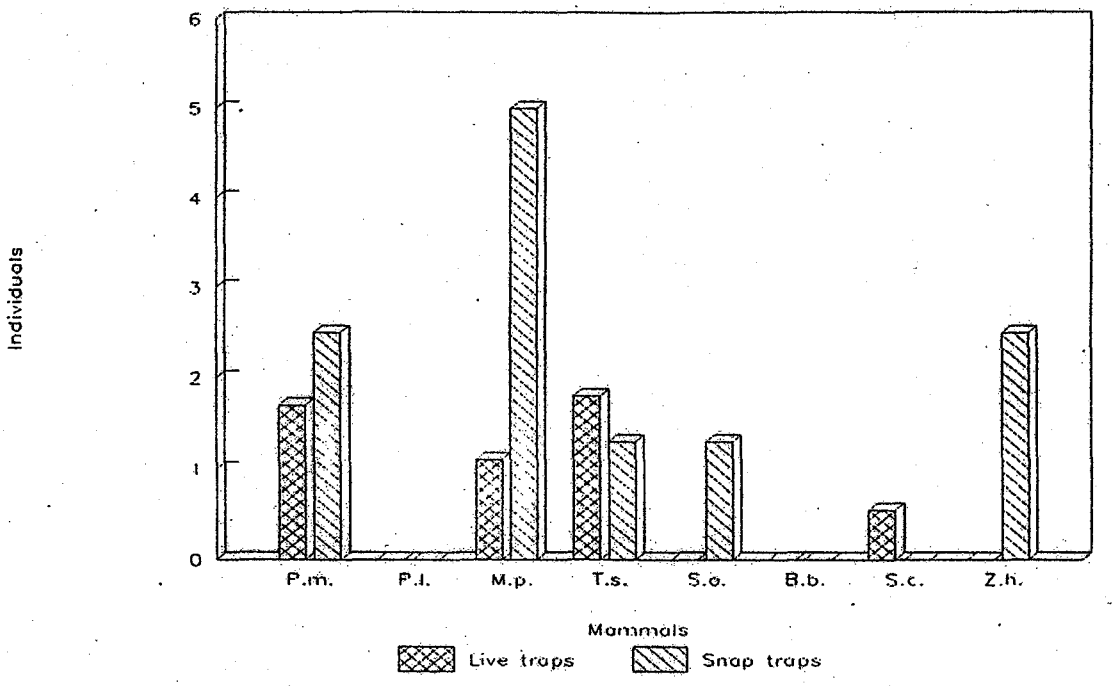
% represents each species'percentage from total individuals of all species at the site.

Figure 7. Small mammals trapped per 100 trap nights at control area C1 along the Sheboygan River in June 1993.



P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c. = Sciurus carolinensis; Z.h. = Zapus hudsonicus.
% represents each species'percentage from total individuals of all species at the site.

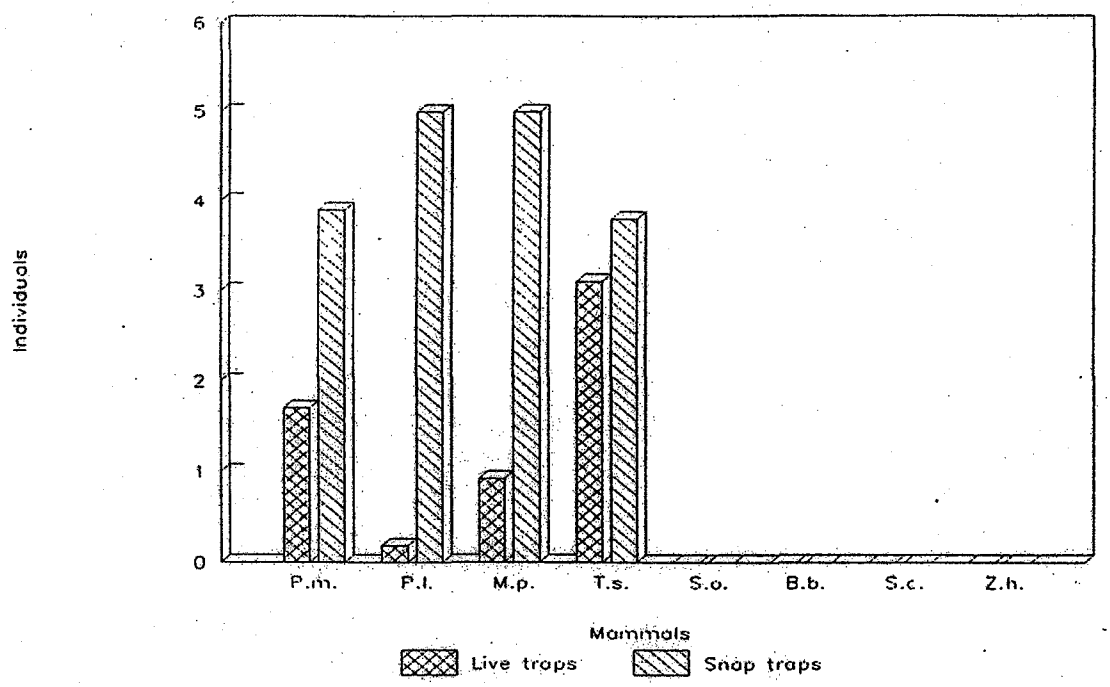
Figure 8. Small mammals trapped per 100 trap nights at control area C2 along the Sheboygan River in July 1993.



P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c. = Sciurus carolinensis; Z.h. = Zapus hudsonicus.

% represents each species'percentage from total individuals of all species at the site.

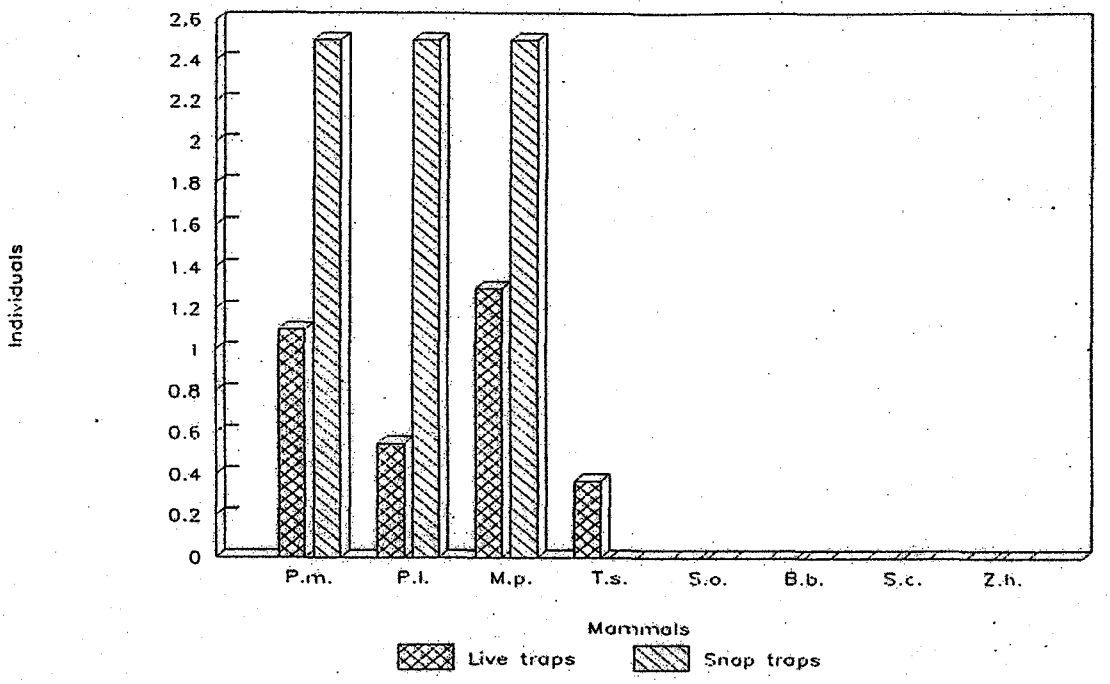
Figure 9. Small mammals trapped per 100 trap nights at study area Lodge along the Sheboygan River in June 1993.



P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c. = Sciurus carolinensis; Z.h. = Zapus hudsonicus.

% represents each species'percentage from total individuals of all species at the site.

Figure 10. Small mammals trapped per 100 trap nights at study area CoA along the Sheboygan River in July 1993.



P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c. = Sciurus carolinensis; Z.h. = Zapus hudsonicus.
% represents each species'percentage from total individuals of all species at the site.

Figure 11. Small mammals trapped per 100 trap nights at study area Oxbow along the Sheboygan River in August 1993.

Table 1. Small mammals live trapped at control and study areas along the Sheboygan River in summer 1993

Area	Mammals[a]								
	P.m.	P.l.	M.p.	T.s.	S.o.	B.b.	S.c.	Z.h.	TOTAL
C1									
first captures	16	2	20	0	3	0	0	0	41
recaptures	15	5	4	0	0	0	0	0	24
%[b]	39	5	49	0	7	0	0	0	100
C2									
first captures	8	1	3	0	9	2	0	1	24
recaptures	15	0	0	0	0	1	0	0	16
%	33	4	13	0	38	8	0	4	100
Lodge									
first captures	9	0	6	10	0	0	2	0	28
recaptures	18	0	3	11	0	0	1	0	33
%	32	0	21	36	0	0	7	0	100
CoA									
first captures	9	1	5	17	0	0	0	0	32
recaptures	21	0	0	26	0	0	0	0	47
%	28	3	16	53	0	0	0	0	100
Oxbow									
first captures	6	3	7	2	0	0	0	0	18
recaptures	22	0	4	3	0	0	0	0	29
%	33	17	39	11	0	0	0	0	100

[a] P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; S.c = Sciurus carolinensis; Z.h. = Zapus hudsonicus.

[b] % represents each species' percentage from total individuals of all species at the site.

Table 2. Small mammals snap trapped at control and study areas along the Sheboygan River in summer 1993

Area	Mammals[a]							
	P.m.	P.l.	M.p.	T.s.	S.o.	B.b.	Z.h.	TOTAL
C1								
first captures	1	2	2	0	1	0	2	8
%[b]	12.5	25	25	0	12.5	0	25	100
C2								
first captures	1	2	0	0	1	1	1	6
%	17	32	0	0	17	17	100	100
Lodge								
first captures	2	0	4	1	1	0	2	10
%	20	0	40	10	10	0	20	100
CoA								
first captures	3	4	4	3	0	0	0	14
%	21	29	29	21	0	0	0	100
Oxbow								
first captures	6	3	7	2	0	0	0	18
recaptures	22	0	4	3	0	0	0	29
%	33	17	39	11	0	0	0	100

[a] P.m. = Peromyscus maniculatus; P.l. = Peromyscus leucopus; M.p. = Microtus pennsylvanicus; T.s. = Tamias striatus; S.o. = Sorex cinereous; B.b = Blarina brevicauda; Z.h. = Zapus hudsonicus.

[b] % represents each species' percentage from total individuals of all species at the site.

Table 3. Lincoln - Peterson estimates for small mammals per hectare at control and study areas along the Sheboygan River in summer 1993

	C1	C2	Lodge	CoA	Oxbow
Peromyscus maniculatus (per hectare)	29.00	6.760	15.15	17.30	
Microtus pennsylvanicus (per hectare)	409.0	*	26.00	*	
Tamias striatus (per hectare)	**	**	7.700	31.90	

* No recaptures; sample size too small
** No chipmunks found

Appendix 1

Specimans sent for contaminant analysis

Area	Mammals[a]						
	P.m.	P.l.	M.p.	S.o.	T.s.	Z.h.	TOTAL
C1	4	2	7	4			17
C2		1		6			7
Lodge	2		6	1	2	2	13
CoA	3	4	4		2		13
Oxbow	1	1	1				3
TOTAL	10	8	18	11	4	2	53

[a] P.m. = (Peromyscus maniculatus); P.l. = (Peromyscus leucopus); M.p. = (Microtus pennsylvanicus); S.o. = (Sorex cinereous); T.s. = (Tamias striatus); Z.h. = (Zapus hudsonicus).

WISCONSIN
DEPT. OF NATURAL RESOURCES

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor
George E. Meyer, Secretary
Gloria L. McCutcheon, Regional Director

Southeast Region Annex
4041 North Richards Street
PO Box 12436
Milwaukee, Wisconsin 53212-0436
Telephone 414-229-0800
FAX 414-229-0810

September 25, 2000

Mr. Steven Jawetz
Beveridge & Diamond
Suite 700
1350 I Street, N.W.
Washington, D.C. 20005-3311

Dear Mr. Jawetz:

I am resending you copies of the responses to items 8&10 of your August 7, 2000 request for additional information regarding the Sheboygan River and Harbor Superfund Site. The originals were doubled sided and, as you discovered, I only sent you side one of each page. I hope this did not cause you too much inconvenience.

Please contact me at 414-229-0853 if you have any questions or care to discuss this matter.

Sincerely,

Thomas A. Wentland
Waste Management Engineer
Remediation and Redevelopment Team

Cc/ File FID No.

WISCONSIN
DEPT. OF NATURAL RESOURCES

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Southeast Region Annex
4041 North Richards Street
PO Box 12436
Milwaukee, Wisconsin 53212-0436
Telephone 414-229-0800
FAX 414-229-0810

September 15, 2000

Mr. Steven Jawetz
Beveridge & Diamond
Suite 700
1350 I Street, N.W.
Washington, D.C. 20005-3311

Dear Mr. Jawetz:

This is in response to your August 7, 2000 request for additional information regarding the Sheboygan River and Harbor Superfund Site. I am enclosing our responses for Item No 5, 8, 10, and 11. Ms. Kathy Patnode who is no longer with the Department did the majority of the work on the remaining items and we are experiencing some difficulty in locating the information you requested. I would like to assure you we are working on providing the remainder of your request and will foreword the information to you as soon as possible.

Please contact me at 414-229-0853 if you have any questions or care to discuss this matter.

Sincerely,

Thomas A. Wentland
Waste Management Engineer
Remediation and Redevelopment Team

Cc/ File FID No.

Wentland, Thomas A

From: Burzynski, Marsha B
Sent: Wednesday, August 16, 2000 2:25 PM
To: Wentland, Thomas A
Subject: RE: FOIA

no problem on that. I'll wait for the final word and get the notes together. So, you think what they said for the 1997 sampling is really what I did in 1994?

From: Wentland, Thomas A
Sent: Wednesday, August 16, 2000 2:02 PM
To: Schrank, Candy S; Burzynski, Marsha B
Cc: Amrhein, James F
Subject: RE: FOIA

Your response is good enough for me . I will convey it to the Tecumseh attorneys.

As for field notes. I thought Linda said if someone is working on a draft report which would be confidential until it becomes final, then the notes would be confidential, but once the report become open record then the notes would be open record. Icalled Linda but she is out. Don't do copying until you hear from me.

Tom W.

From: Burzynski, Marsha B
Sent: Wednesday, August 16, 2000 1:39 PM
To: Wentland, Thomas A; Schrank, Candy S
Cc: Amrhein, James F
Subject: RE: FOIA

#5

Good question Candy. The fish collections I did were in 1994. Tom, I also remember going through this once before. For the stomach samples taken, I was not able to recover the contents. We preserved the contents in vials containing alcohol, however unknown to me at the time, the caps were not air tight. The alcohol evaporated from the vials and left the dried remains of the contents unable to be recovered.

We only took a subsample of one or two stomachs anyway, so the analysis would not have been very conclusive if we were able to analyze the contents. It was mistakenly thought before that we were going to analyze the contents for PCBs. This is not correct. We were just going to see what the fish were eating as a check on our food chain assumptions.

Anyway, no info on the contents available since the contents were not recoverable. Sorry about that.

Now, about field notes. I thought we went through this once before with Linda Meyer, that field notes are FOIA exempt or something like this. If the field notes they want during the collections are mine from the 1994 collections, I don't have a big problem xeroxing them (they are very light however), but don't want to do something against what we agreed upon the last time these requests came through.

Marsha

From: Schrank, Candy S
Sent: Wednesday, August 16, 2000 10:02 AM
To: Wentland, Thomas A
Cc: Amrhein, James F; Burzynski, Marsha B
Subject: FOIA

Tom - regarding the recent request for information on the Sheboygan.

I am not sure what #7 ("we request the field notes take during the 1997 fish collections.") is referring to. You have my name listed but I did not do collections in 1997..... Marsha, Jim, Steve - do you have any idea what they are referring to? Could it be the collections by the EVS for the ERA?

I will work on getting you some stuff for #10.

CORRESPONDENCE/MEMORANDUM

State of Wisconsin
Department of Natural Resources

DATE: April 1, 1996 FILE REF: 3600

TO: Randy Schumacher - Eagle

FROM: John E. Nelson - Plymouth

SUBJECT: Sheboygan River Fisheries and Habitat Survey - 1994

SUMMARY

We surveyed portions of the Sheboygan River between Millhome and Sheboygan in the summer of 1994 to evaluate the fish habitat and community, and to formulate management recommendations for the river. We found that habitat quality was generally good but, was limited by the amount of pool habitat available to the fish. Smallmouth bass were common in the lower reaches of the river below Johnsonville and were absent from Johnsonville to Millhome. The quality of the fish community ranged from good to poor with the highest quality in the lower reaches. Dams at Johnsonville and Franklin likely have the greatest negative impact on the fish community health and movement of fish. I recommend that both dams be removed and that greater emphasis be placed on the reduction of non-point source pollutants.

METHODS

We surveyed fish habitat and fish populations at seven sample sites along the Sheboygan River from river mile (RM) 3.5 to RM 40.5 during the summer of 1994. A 3,000 foot long sample reach was established at each site.

Fish habitat was evaluated using the Fish Habitat Rating - Rivers (FHR-R) system developed by Simonson, et al. (1994). The FHR-R model rates habitat quality based on metrics including bank stability, maximum thalweg depth, bend to bend ratio, percent rocky substrate and percent of cover for fish. Data were collected at 16 cross channel transects at each site. The data were averaged by metric and assigned the appropriate metric score. The metric scores were summed, giving the site a qualitative rating of excellent to poor habitat quality.

Fish populations were evaluated using the Index of Biotic Integrity (IBI) methodology developed by Lyons (1992) for warmwater streams in Wisconsin. We collected all gamefish along each 3,000' reach with the exception of Site 6. At Site 6 only 2,000' was electrofished due to extreme low water conditions. The standard Wisconsin stream electrofishing unit with three anodes and three people capturing fish was used. All fish were collected for IBI analysis along a 1,500' reach at each site, starting at the 500' point of the site. Fish that could not be identified in the field were preserved and returned to the lab for identification. Gamefish were also measured to collect total length data.

SITE DESCRIPTIONS

The Sheboygan River is the largest river in Sheboygan County. The headwater area is located in eastern Fond du Lac County near Dotyville. The river then flows northeast where it is impounded to form Sheboygan Marsh, Kiel Marsh, Rockville Impoundment and Millhome Impoundment. At Millhome the river flows southeasterly and is impounded at Franklin, Johnsonville, Sheboygan Falls and twice in Kohler. It continues to flow easterly from Kohler, entering Lake Michigan in the City of Sheboygan.

The data presented in this report were collected along the main stem of the Sheboygan River from river mile (RM) 3.5 to RM 40.5 (Figure 1). The entire reach between RM 3.5 - 40.5 covers the river from where it enters the estuary to a short distance below the Millhome Dam. The average stream width at the seven sites was 74.9'.

Site 1 began at RM 3.5, upstream from Indiana Avenue near Taylor Drive in the City of Sheboygan. Esslingen Park borders much of the north bank of the site and the remainder was bounded by Indiana Avenue and the UW-Sheboygan campus. It was located in SW 1/4, NE 1/4, Sec. 28, T15N, R23E. The average stream width of the site was 83.2'.

Site 2 began at RM 17.4, upstream from the Meadowlark Road bridge in the Town of Sheboygan Falls. The south and west bank was primarily wooded while the opposite side was former farmland that is now mowed as lawn by the landowners. It was located in the SE1/4, NE1/4, Sec. 27, T15N, R22E. The average stream width of the site was 73.6'.

Site 3 began at RM 21.8, upstream from the Alpine Road bridge in the Town of Sheboygan Falls. It flowed through an area farmed for row crops and hay. It was located in the SE1/4, NW1/4, Sec. 21, T15N, R22E. The average stream width of the site was 72.6'.

Site 4 began at RM 29.4, upstream from the CTH "J" bridge in the Town of Sheboygan Falls and downstream from Johnsonville. Some row crop land was present though most of the riparian zone was retired from crop production. It was located at the SW1/4, SW1/4, Sec. 6, T15N, 22E. The average stream width of the site was 63.5'.

Site 5 began at RM 32.4, upstream from the Garton Road bridge in the Town of Herman. It flowed through an area of forested cover and a small amount of crop land. The Johnsonville Dam was located downstream of the site and the Franklin Dam was located approximately one mile upstream. It was located in the SE1/4, SW1/4, Sec. 30, T16N, R22E. The average stream width of the site was 66.0'.

Site 6 began at RM 36.7, upstream from the CTH "MM" in the Town of Herman. It flowed through a combination of forested and crop land. It was located at the SW1/4, SW1/4, Sec. 7, T16N, R22E. The average stream width of the site was 91.0'.

Site 7 began at the CTH "MC" bridge in the Town Of Rhine. It flowed through mostly forested terrain with a small amount of cropland at the upstream end of the station. It was located in the NE1/4, NE1/4, Sec. 2, T16N, R21E. The average stream width of the site was 74.0'.

HABITAT QUALITY

The overall FHR-R value for the portion of the Sheboygan River covered in this survey was 67 (Table 1). The score of 67 falls within the range of "Good" quality habitat.

Table 1. Sheboygan River Fish Habitat Ratings - 1994.

Metric	Site							
	All	1	2	3	4	5	6	7
Bank Stab. - %	81.0 (8)	84.0 (9)	78.4 (8)	88.1 (10)	60.3 (4)	78.0 (8)	78.4 (8)	100 (12)
Max. Thal. - ft.	0.81 (9)	1.12 (16)	0.86 (10)	0.72 (8)	0.97 (11)	0.91 (12)	0.44 (0)	0.62 (5)
Bend:Bend ratio	44.2 (0)	16.6 (4)	132.7 (0)	15.5 (3)	14.9 (6)	18.9 (4)	43.9 (0)	67.0 (0)
Rock Sub. - %	77.6 (25)	81.8 (25)	75.2 (25)	69.6 (22)	79.4 (25)	96.5 (25)	76.4 (25)	63.6 (19)
Cover - %	25.0 (25)	15.0 (25)	21.5 (25)	9.4 (16)	33.0 (25)	39.6 (25)	36.6 (25)	20.0 (25)
Tot.Score	67	79	68	59	71	74	58	61
Rating	Good	Good/Ex.	Good	Fair/Gd.	Good	Good	Fair/Good	Good/Fair

* FHR-R value for individual metrics in parentheses.

Maximum values were given for the rocky substrate and fish cover metrics. Rubble and gravel were the predominant substrates at 36.4% and 35.3%, respectively. Most of the cover consisted of overhanging vegetation (11.0), primarily tree branches. Overhanging vegetation was followed in importance by woody debris (6.6%) and boulders (4.9%). More woody debris in the stream channel along with greater depth in pools would provide better habitat for species such as smallmouth bass, rock bass and northern pike.

A good rating was given for bank stability and a fair rating was given for thalweg depth. 81.0% of the river banks were stable and most of the erosion was due to natural conditions such as flow and soil type rather than man-made disturbances. The average maximum thalweg depth of the seven sites was 2.66'. The thalweg depth was a function of sparse pools, below normal flows, fairly high channel gradient and rocky substrate composition.

A zero score was given for bend:bend ratio. The section of the Sheboygan River covered by this survey is generally straight in nature rather than being highly meandered because of its geological setting. The river has a fair gradient as it flows from the edge moraines toward Lake Michigan. The stream channel appears to be at a cutting stage rather than a depositional stage so, the channel naturally runs a straighter course. Streams in depositional or alluvial areas generally more sinuous.

Site 1 - Taylor Drive

Site 1 had the highest score of any single survey station with a value of 79 (Table 1). That score fell within the good to excellent range. This section was given the highest possible scores for rocky substrate and fish cover. The substrate consisted of 42.1% rubble and 32.5% gravel. Boulders provided 6.9% of the fish cover and woody debris provided an addition 5.0% of cover. Fish cover could be improved at this site to improve habitat for both resident warmwater fish and seasonal runs of salmonids.

Bank stability was good to excellent and thalweg depth was good. The bend:bend ratio was fair. Bank stabilization efforts could be conducted to eliminate erosion and improve fish habitat. However, PCB contamination of some sediments may be a factor in such efforts.

Site 2 - Maedowlark Road

Site 2 had a FHR-R value of 68 which is considered good habitat (Table 1). Rocky substrate and fish cover were given maximum scores. Rubble and gravel covered 38.1% and 34.0% of the bottom, respectively. Fish cover consisted of primarily overhanging vegetation (10.0%). Fish cover could be improved in that section of river by increasing the amount of woody debris.

Bank stability was good while thalweg depth was fair to good. The site was fairly straight so the bend:bend ratio

was given a poor score. The Left bank was 63.4% stable and the right bank was 93.4% stable. Access to eroding banks would be difficult and unstable banks appeared to be the result of natural erosion along steep shoreline areas.

Site 3 - Alpine Road
The habitat at site 3 was rated as fair to good with an FHR-R score of 59 (Table 1). Rocky substrate was considered excellent to good and cover was good. Rubble made up 34.6% of the substrate and gravel made up 32.8%. Fish cover consisted of several cover types. Fish cover could be improved to increase the overall habitat quality of the site and adjacent areas. The addition of woody debris would be especially beneficial to sport fishes.

Bank stability was good to excellent with 88.1% of the banks being stable. Maximum thalweg depth and bend:bend ration were both given a fair rating.

Site 4 - CTH "J"
Site 4 was rated as good overall habitat with a FHR-R value of 71 (Table 1). It received the highest possible scores for rocky substrate and fish cover. Rubble covered 30.0% of the bottom and gravel covered 40.3%. Woody debris (15.9%) and overhanging vegetation (11.8%) provided most of the fish cover.

The bend:bend ratio and maximum thalweg depth rating were fair to good. The bank stability was fair with the lowest percent stability (61%) of any site surveyed. Management to improve the bank stability would probably improve fish cover as well. The erosion was probably related to the natural erosion at bends in the river at that site.

Site 5 - Garton Road
Site 5 was rated as good overall habitat with a FHR-R value of 74 (Table 1). Rocky substrate and fish cover had the highest possible scores. The high quality substrate consisted of 63.1% rubble and 23.7% gravel. Fish cover was provided mostly by overhanging vegetation (21.8%) in the form of tree branches. Woody debris covered 7.5% of the area but, could be increased to provide even better habitat.

Bank stability was good, thalweg depth was fair to good and bend:bend ratio was fair. Improvement of bank stability had the highest potential for improving the overall habitat.

Site 6 - CTH "MM"
Site 6 had the lowest overall score with a value of 58 (Table 1). It was rated as fair to good habitat.

Rocky substrate and fish cover were give the maximum values. Gravel was the predominate substrate type (54.3%). Only 14.3% of the substrate consisted of rubble. Fish cover was provided by overhanging vegetation (15.9%), woody debris (9.7%) and boulders (8.8%).

Bank stability was rated as good with 78.4% of the banks being stable. Bank stability improvements would have the most impact on improving the overall habitat. Maximum thalweg depth and bend:bend rating were both poor.

Site 7 - CTH "MC"
The overall rating for site 7 was good to fair habitat with a score of 61 (Table 1). Cover for fish and bank stability were given the maximum values. Overhanging branches provided the most cover (13.0%). Other forms of cover were very limited. Increased woody debris would be most beneficial to habitat diversity at this site. The banks were appraised as being 100% stable.

Rocky substrate was good to excellent. Rubble covered 32.3% of the substrate and gravel covered 29.3%. Sand was also abundant, covering 31.0% of the bottom.

Maximum thalweg depth was fair to poor and bend:bend ratio was poor. Shallow pools were found at two of the sixteen transects.

FISH COMMUNITY

A total of 29 different fish species were collected from all survey sites along the Sheboygan River in 1994 (Appendix). IBI scores were calculated for the individual survey sites. The three sites at the downstream end of the survey section, Sites 1, 2 and 3, were rated as having good biotic integrity (Table 2). The four upstream sites had fair to poor biotic integrity. All IBI scores might have been higher if the catch rates had been higher. However, high turbidity conditions and difficult electrofishing conditions probably limited the number of fish captured by the electrofishing gear.

Table 2. Sheboygan River IBI values and ratings - 1994.

	Sites						
Metric	1	2	3	4	5	6	7
# Native Species	12	12	11	15	12	12	15
# Darter Species	0	3	2	2	2	2	2
# Sucker Species	2	2	2	2	1	1	1
# Sunfish Species	3	2	2	1	2	4	3
# Intol. Species	6	2	2	2	1	1	1
% Tolerant Species	10	10	10	10	5	5	5
% Omnivores	10	10	10	5	0	7	0
% Insectivores	5	10	10	10	5	10	0
% Top Carnivores	10	10	10	2	0	5	0
% Sim. Lithotrophs	10	5	10	5	10	5	7
# indiv./300m^2	-10	-10	-10	-10	-10	-10	-10
Score	58	56	59	44	28	42	24
Rating	Good	Good	Good	Fair	Poor	Fair	Poor

Dams apparently limited the ability of some species to migrate into the upper three sites, further decreasing their scores. Smallmouth bass and golden redhorse were common at Sites 1 - 4 but, were not collected at Sites 5 - 7.

Seven centrarchid species were collected of which smallmouth bass and rock bass were the predominant species. A few northern pike and walleye were collected at several sites. Four additional percid species were collected including yellow perch, Johnny darter, log perch and blackside darter. Stonecat, channel catfish and yellow bullhead made up the ictalurid species collected. Rainbow trout and brown trout were collected from Site 1 and were migratory fish stocked for the Lake Michigan fishery. Golden redhorse and white sucker were the only sucker species collected. Seven cyprinid species were collected of which carp, common shiner, horneyhed chub and sand shiner were the most common. Both alewife and gizzard shad were collected at Site 1.

Site 1 - Taylor Drive

The fish community at Site 1 was given an IBI score of 58 which rates the community as having "good" biotic integrity. The exclusion of rainbow trout and brown trout from the sample decreased the score to 57. Fifteen species were collected at the site.

We captured 72 smallmouth bass at a rate of 24/1000'. They were the most common sport fish captured followed

by rainbow trout (17 @ 5.6/1000'). The other sport fish were rock bass, brown trout, channel catfish, walleye, bluegill and pumpkinseed.

Golden redhorse were the most common non-game fish in the sample. Fifty nine redhorse were captured at a rate of 39.3/1000'. White sucker, common shiner, alewife and gizzard shad were also common in the sample.

Angler access to the section of river at Site 1 is very good and angler use is very high at times. Despite concerns with PCB contamination, harvest of game fish may be high and the sport fishery may be impacted by angler harvest.

Site 2 - Meadowlark Road

The IBI score for the fish community at Site 2 was 56. That score rates the community as having good biotic integrity. Thirteen species were collected at the site.

Smallmouth bass were the most common sport fish in the sample. We captured 57 bass at a rate of 19.0/1000'. Several large adult bass were found at the site but, few yearlings were collected. The remaining sport fish in the sample included 28 rock bass (9.3/1000'), 5 northern pike and 3 black crappie.

Golden redhorse were the most common non-game species. They were captured at a rate of 43.3/1000'. Common shiner, horneyhead chub and sand shiner were also common and were each captured at a rate of 28.0/1000'.

Site 3 - Alpine Road

Site 3 had the highest overall IBI score of 59 which rated the fish community as having good biotic integrity. The diversity of species was low with only 11 species of fish collected at the site but, both insectivores and simple lithotrophs were common in the sample which elevated the overall IBI score.

Catch rates for all species were low at Site 3. Smallmouth bass were the most common sport fish with 28 being captured at a rate of 9.3/1000'. The only other sport fish captured were 8 rock bass and 1 black crappie.

Golden redhorse were captured at a rate of 21.3/1000' and were the most common non-game fish. Sand shiner, common shiner and white sucker were also common.

Site 4 - CTH "J"

The fish community at Site 4 had fair biotic integrity with an IBI score of 44. A combination of few top carnivores and high numbers of omnivores (carp and white suckers) resulted in the low score compared to Sites 1 - 3. Sixteen species of fish were collected at the site.

Rock bass were the most abundant sport fish followed by smallmouth bass. We caught 47 rock bass (15.7/1000'), 10 smallmouth bass (3.3/1000') and 4 northern pike (1.3/1000'). Two walleye were also captured.

Carp and golden redhorse were abundant with carp caught at a rate of 62.0/1000' and redhorse caught at a rate of 42.0/1000'. Sand shiners were also abundant with a catch rate of 68.7/1000'. The next most common non-game species were white sucker, common shiner, longnose dace and log perch.

Site 5 - Garton Road

Site 5 had a low IBI score of 28 which is considered a poor level of biotic integrity. Only 13 species of fish were captured at the site. The low IBI score was a result of high numbers of omnivores (white suckers), few top carnivores and a high number of tolerant species in the sample. Site 5 is likely impacted by the Franklin Millpond, a short distance upstream. Higher than normal summer temperatures and turbidity levels may influence the distribution of some top carnivores.

Rock bass were the only top carnivores captured at the site. Twenty two rock bass were captured at a rate of 7.3/1000'. Two pumpkinseed were also caught.

White sucker were abundant and were captured at a rate of 93.3/1000'. The next most common non-game species

were stonecat, log perch and longnose dace.

Site 6 - CTH "MM"
The IBI score for Site 6 was 42 which rates the fish community as having fair biotic integrity. Thirteen species were captured of which 5 were sport fish. The low IBI score was impacted by the low number of top carnivores, low number of lithotrophs and high number of tolerant species found in the sample.

A total of 18 rock bass were captured at a rate of 9.0/1000'. Five northern pike were also captured at a rate of 2.5/1000'. Low numbers of bluegill, pumpkinseed and green sunfish were captured.

The primary non-game fish captured were sand shiner (48.0/1000'), log perch (16.0/1000') and white sucker (14.0/1000').

Site 7 - CTH "MC"
Site 7 had the lowest overall IBI score of 24 which rated it as having a fish community with poor biotic integrity. We collected 16 species of fish at the site which was one of the two highest levels of species diversity found at the seven sites. The high number of tolerant fishes and the low number of top carnivores in the sample were the two major factors in the low IBI score.

Sixteen rock bass ((5.3/1000') and 11 northern pike (3.7/1000')were captured. We also caught 24 green sunfish, 3 pumpkinseed and one largemouth bass.

The non-game fish were dominated by carp and white sucker. We caught white sucker at a rate of 67.3/1000' and carp at a rate of 42.7/1000'. The other common species were longnose dace, creek chub, sand shiner, and log perch.

Smallmouth Bass
We captured 167 smallmouth bass during this survey. The bass ranged in size from 3.6" to 17.5" with a mean size of 9.5". The size structure of the sample indicated that recruitment was relatively stable and a good quality size structure exists (Figure 2). The smallmouth bass PSD was 38.8% and the RSD_{14} was 18.6%. The Sheboygan River has potential to provide high quality smallmouth bass angling. The population could expand to upper reaches of the river if the dams at Johnsonville and Franklin were removed.

DISCUSSION

The lack of pool habitat, measured as the maximum thalweg depth metric, was the most limiting factor to habitat quality and fish populations along the survey reaches. The rocky substrate of the stream prohibits the establishment of pools. Pools could be created by physically removing stream-bed material with excavating equipment. However, such work would be expensive and would be difficult to conduct on a large scale. Such techniques may also be short lived.

The results of this survey indicate that site specific habitat quality is not the sole factor in determining the integrity or quality of fish populations in a riverine system. Sites 1, 2, 3, 4, and 6 had habitat and IBI ratings that were seemingly compatible (Table 3). Sites 5 and 7 had good FHR-R scores but poor IBI scores. Sites 5 and 7 were located a short distance downstream of the Franklin and Millhome dams. The low IBI scores at those sites likely reflect the negative impact of dams on water quality (increased summer temperatures and turbidity). Less tolerant species likely do not inhabit those areas and are replaced by highly tolerant species such as carp when carp "seed" downstream areas from their preferred habitat in impounded areas. Temperature sensitive species such as northern pike may be most negatively impacted by the high water temperatures being discharged by the impoundments.

Table 3. Comparison of habitat quality rating and fish biotic integrity in the Sheboygan River.

Habitat/Biotic Integrity	Site						
	1	2	3	4	5	6	7
Hab. Rating (FHR-R)	67 (Good)	79 (Gd/Ex)	68 (Good)	59 (Fr/Gd)	71 (Good)	58 (Fr/Gd)	61 (Gd/Fr)
Biotic Integrity (IBI)	58 (Good)	56 (Good)	59 (Good)	44 (Fair)	28 (Poor)	42 (Fair)	24 (Poor)

The dams at Johnsonville and Franklin impede or prevent the upstream movement of smallmouth bass during the spring migration from over-winter to summer habitat. No smallmouth bass were found above the Johnsonville Dam. Removal of both the Johnsonville and Franklin dams would allow smallmouth to move into upper reaches of the river to Millhome. Summer habitat in the river upstream of both dams is suitable for smallmouth bass. Stocking of smallmouth bass into the reaches above the dams would not result in the establishment of good smallmouth populations as the bass would migrate downstream of the dams in fall as they sought over-winter habitat and would be unable to return upstream in spring.

The removal of the Johnsonville and Franklin dams would also decrease the amount of habitat suitable for carp. Reductions in the carp populations would result in improvements in water clarity that would better suit sight feeding fish such as northern pike. Northern pike would also have better access to good quality spawning and rearing habitat if the dams were removed.

MANAGEMENT RECOMMENDATIONS

The removal of the Johnsonville and Franklin dams would have the most profound and immediate positive impacts on the fish community of the Sheboygan River of any possible management action. Dam removal would result in better northern pike reproduction and survival; establishment of smallmouth bass populations upstream to Millhome; and improvements in water temperature and clarity. Therefore, I recommend that both dams be removed.

Improvements in upland management within the watershed are needed to improve water quality as well. Sediment delivery to the stream from upland areas reduces water clarity and lowers the ability of the stream to carry the natural bedload. Nutrient reductions are likewise important as the stream appears to suffer from high fertility and the resultant excessive plant growth in the form of vascular plants and filamentous algae. Excessive plant growth causes unnatural swings in oxygen levels from super-saturation during the day and severe depletion during night time hours as the plants respire. I recommend that additional effort and support be given to the control of non-point sources of pollution in the Sheboygan River watershed.

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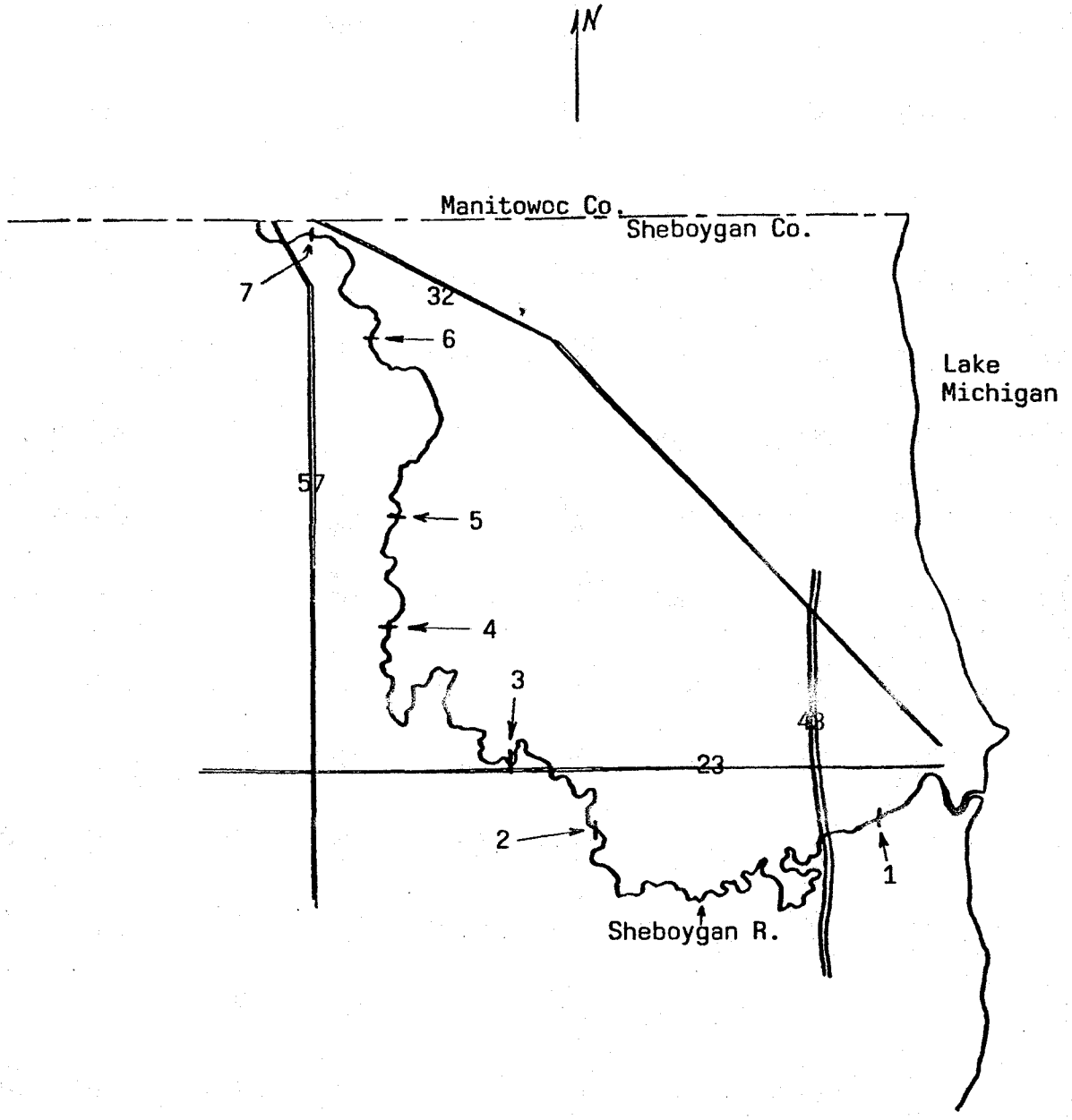

Figure 1. Sample site locations on the Sheboygan River - 1994.

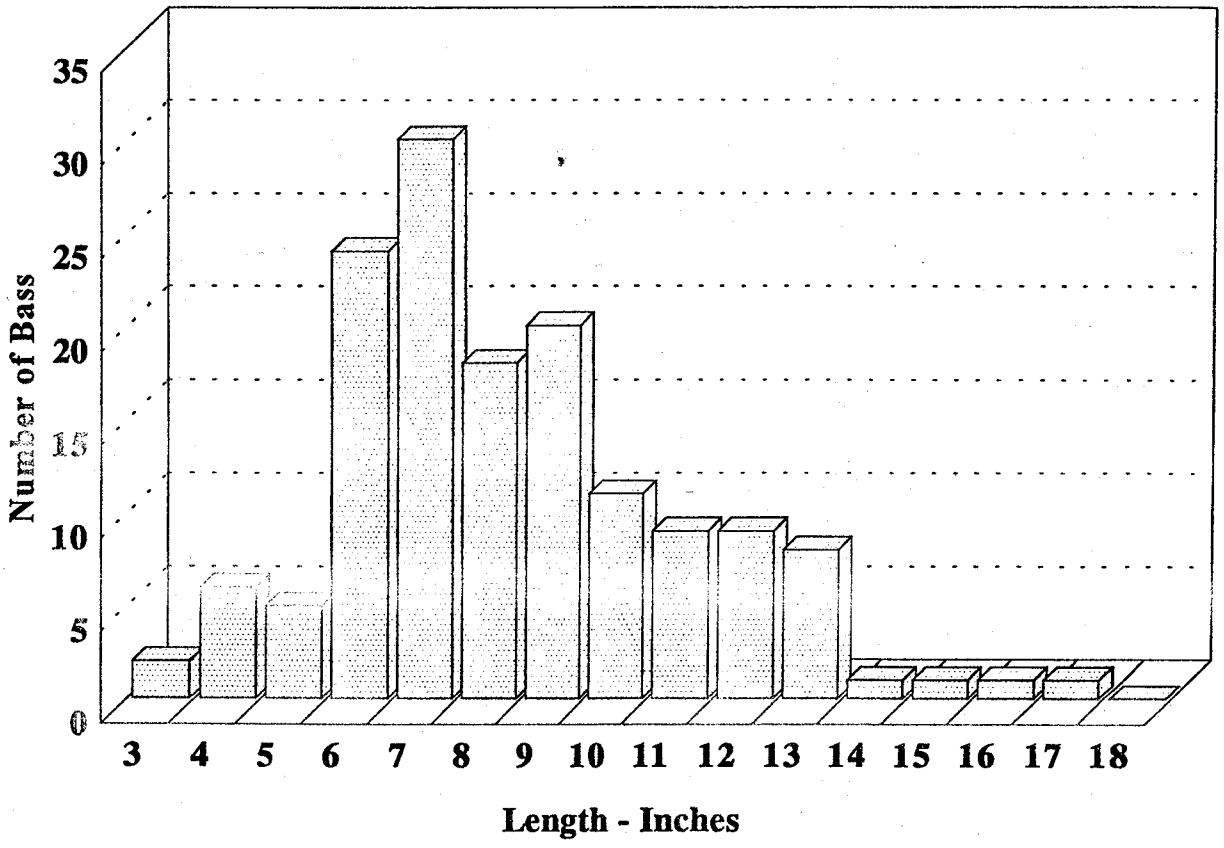

Figure 2. Smallmouth bass length frequency distribution - Sheboygan River - 1994.

Appendix - Fish capture by site - Sheboygan River - 1994

Species	1	2	3	4	5	6	7	Sum
Smallmouth Bass	72	57	28	10				167
Rock Bass	12	28	8	47	22	18	16	151
Bluegill	1					1		2
Pumpkinseed	1				2	3	3	9
Black Crappie		3	1					4
Green Sunfish						2	24	26
Largemouth Bass							1	1
Northern Pike		5		4		5	11	25
Walleye	1			2				3
Y. Perch				1				1
Johnny darter				8	1	10	1	20
Log Perch		9	4	15	28	24	16	96
Blackside Darter		3	1					4
Stonecat	4	5	6	2	36	7	1	61
Channel catfish	3							3
Yellow Bullhead					1	10	1	12
Rainbow Trout	17							17
Brown Trout	3							3
Redhores spp	59	65						124
Gold. Redhorse			32	63				95
White Sucker	27	14	11	34	140	21	101	348
Carp	5	11		93	5	9	64	187
Common Shiner	29	42	12	30	10		1	124
Horneyhead Chub		42	3	15	6		4	70
Creek Chub					5		18	23
Sand Shiner		42	20	103		72	18	255
Bluntnose Minnow				8	2	6		16
Longnose Dace				23	31		26	80
Alewife	27							27
Gizzard Shad	21							21
Number of Species	15	13	11	16	13	13	16	

DRAFT

1992 Health Assessment of SMB—

MONITORING OF RELOCATED AND RESIDENT FISH IN AN AREA OF KNOWN PCB CONTAMINATION IN THE SHEBOYGAN RIVER TO DETERMINE BIOACUMULATION AND GENERAL FISH HEALTH ASSESSMENT.

Smallmouth bass (smb) were collected from an upstream site with relatively low PCB contamination and relocated to a downstream site with known PCB contaminants. Fish health assessment was conducted on a subset of the collected fish prior to relocation and a month after relocation. Fish health assessment was also conducted on representatives of fish resident to the downstream location for a comparison between sites and over time.

The stretch of river receiving the relocated fish begins and ends with low head dams. Unfortunately after three months the relocated fish were not found in the stretch. Therefore the value of the results are somewhat limited for statistical analysis in determining the significance in differences between the resident and relocated population over time. Smallmouth bass were taken on two dates and at two locations. Table 1 describes the date of sampling, the location of the sample sites, and the fish collected.

TABLE 1.

Date	Location	Fish	Site
6/19/92	T15N.R23E.Sec23, T15N.R23E.Sec27 (Above Dam)	Clipped and Relocated	1
7/17/92	T15N.R23E.Sec31, T15N.R23E.Sec30 (Below Dam)	Clipped and Relocated	2
6/19/92	T15N.R23E.Sec31, T15N.R23E.Sec30 (Below Dam)	Resident	2
7/17/92	T15N.R23E.Sec31, T15N.R23E.Sec31, (Below Dam)	Resident	2

On June 16, 1992 DNR staff used a shocker (insert gear type) to collect smb on the Sheboygan River (site 1) upstream of Sheboygan Falls at two sites, one site below highway 23 and one site below highway C. Fish health assessment was conducted on twenty individuals and fifty were analyzed for PCBs and percent lipids. Approximately 700 fish were relocated to the area of known high concentrations of PCBs for future recapture. Also on June 19, 1992 the area below the Kohler dam (site 2) was shocked and 30 resident SMB were collected and analyzed for fish health, PCBs, and percent lipids.

On July 17, 1992 the DNR staff returned and sampled the resident and relocated smallmouth bass below the Kohler dam. Twenty eight

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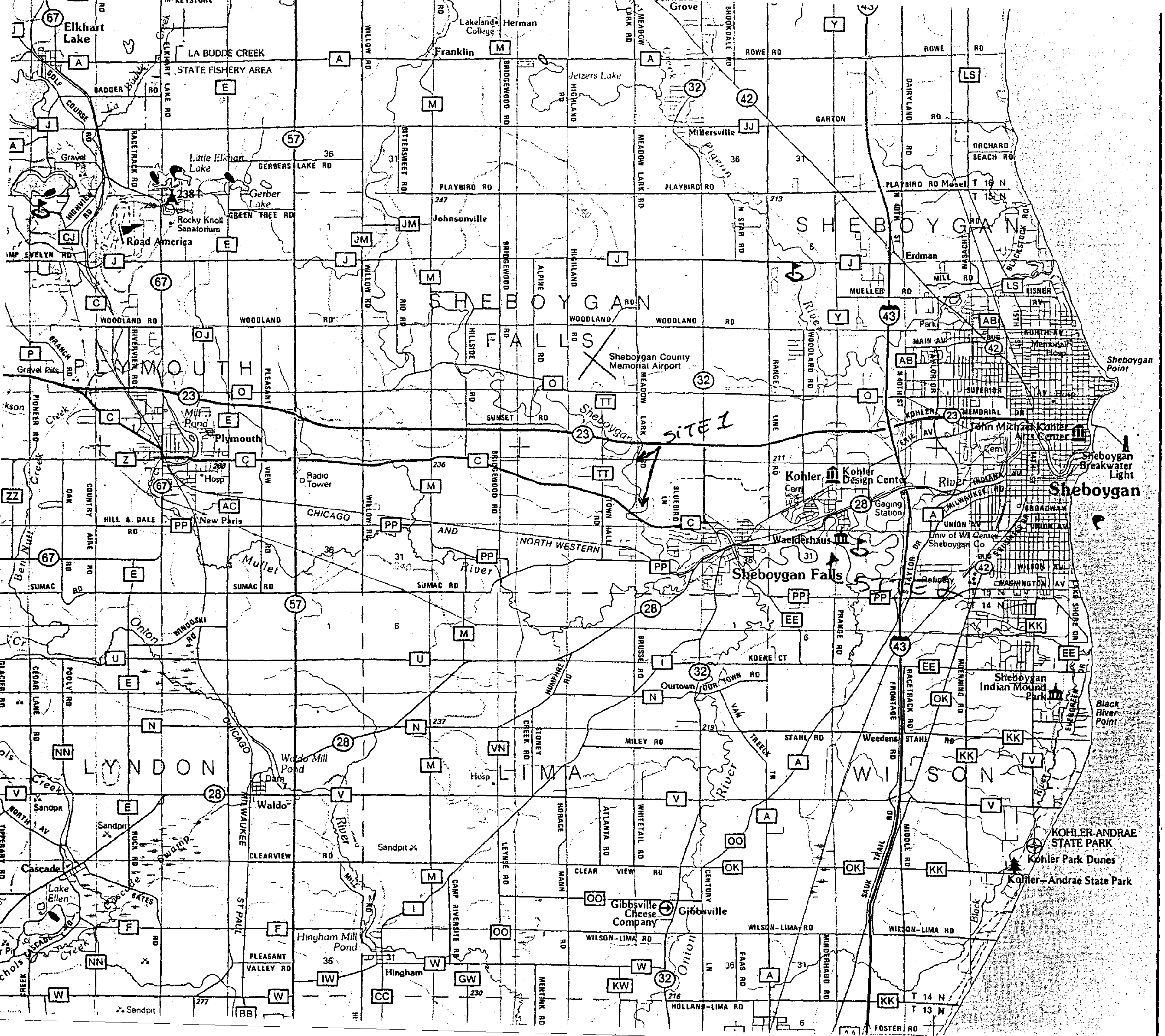
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LA BUDDE CREEK STATE FISHERY AREA
Lakeland College
Herman
Franklin
Grove
Jetzers Lake
Millersville
Little Elkhart Lake
Gerber Lake
Rocky Knoll Sanatorium
Road America
Johnsonville
Erdman
SHEBOYGAN
SHEBOYGAN FALLS
PLYMOUTH
Sheboygan County Memorial Airport
Sheboygan Point
Plymouth
Mill Pond
Radio Tower
New Paris
SITE 1
SITE 2
Kohler
Kohler Design Center
John Michael Kohler Arts Center
Sheboygan Breakwater Light
Sheboygan
Gaging Station
Waelderhaus
Univ of WI Center Sheboygan Co
Sheboygan Falls
Refinery
CHICAGO AND NORTH WESTERN
Ourtown
Sheboygan Indian Mound Park
Black River Point
LYNDON
LIMA
WILSON
Waldo Mill Pond
Waldo
Cascade
Lake Ellen
Cascade Swamp
KOHLER-ANDRAE STATE PARK
Kohler Park Dunes
Kohler-Andrae State Park
Gibbsville Cheese Company
Gibbsville
Hingham Mill Pond
Hingham
Sandpit
T 16 N
T 15 N
T 14 N
T 13 N

B

C

clipped and relocated and 30 resident fish were collected and analyzed with fish health assessment methods and ~~sent to the lab~~ analyzed for ~~contamination analysis~~ PCB. Lastly, Golden Redhorse resident to the downstream site were also collected for health and PCB analysis.

Relocated Smallmouth Bass

Table 2 shows the initial and final physical status for the relocated fish. The average clipped and relocated fish weighed 14g on 6/19 and 42 grams on 7/17 which is a 33% increase in total average weight (Graph 1). The average length of the relocated fish increased by 25mm (17%) over the same time period (graph 2).

Condition factors are a way to compare the relative well-being of fish populations. The larger the coefficient, the heavier the fish for a given length. Table 2 shows the average and range of condition factors for the relocated bass. Average condition factor values dropped by 0.047 (3.5%) from 6/19 to 7/17 (graph 3).

TABLE 2

LOCATION	N	Average Wt.(gm)	Range Wt.(gm)	Average Ln.(mm)	Range Ln.(mm)	Average (CF)	Range (CF)
Above Dam Clipped & Relocated 6/19/92	20	28.1	17.7-36.7	122	108-140	1.337	1.174-1.507
Below Dam Clipped & Relocated 7/17/92	30	42.2	27.8-58.4	147	130-165	1.290	1.143-1.402

Each collected fish was examined by rating fins (spiny dorsal, fleshy dorsal, left and right pectoral, left and right pelvic, and upper and lower caudal) for fraying, erosion, hemorrhaging, and parasites. Table 3 shows the data from 160 observations on twenty fish which were taken from the upstream site on 6/19. Seventy seven percent of the observations had normal conditions. Fraying was present on 23% of the fins, one fin showed positive signs of erosion and no hemorrhaging.

Table 4 shows results on 196 fin observations on 30 relocated fish taken from the downstream site on 7/17 (the right pelvic fin was clipped and therefor not rated). Sixty seven percent showed normal condition, fraying was present on 32%, and 1% showed positive signs for erosion.

Observations were also done on physical characteristics of eyes, operculum, gills, psuedobranch, thyroid, body cavity, spleen,

liver, gallbladder, and hindgut. Table 3 shows that the twenty fish representative of the clipped and relocated fish from 6/19 had 100% normal characteristics for all features except for two parasites found in the spleen and liver. The gall bladders of the fish were all full with a light green color.

Table 4 shows 30 fish representative of the clipped and relocated smb on 7/17 all having healthy organ characteristics excepts for the body cavity and liver. Body cavity observations showed 46% of the bass had adhesions. Liver observations showed that 7% of the fish had parasites and 3% had a pale color.

A blood sample was taken from each fish. Three blood parameters were measured, hematocrit, leucocrit, and serum protein levels (table 7). Hematocrit levels (expressed as percent packed cell volume) measure the volume of red blood cells per unit volume of whole blood. The average hematocrit value was 51% on 6/19 and 40% on 7/17 which is a 10.8% decrease in average percent volume (graph 4).

Leucocrit levels (expressed as percent packed cell volume) are a gross measure of white blood cell abundance. Table 7 shows the values obtained for the clipped and relocated bass. Leucocrit values were not obtained for the fish on 6/19.

Serum protein levels (expressed in g/dL) measure the total concentration of serum protein in a sample. Average serum protein levels for the clipped and relocated fish were 6.55 g\dl on 6/19 and 4.99 on 7/17 (graph 5).

Table 7.

Site & Abrv.	N	Hematocrit(%pcv) Average	Range	Leucocrit(%pcv) Average	Range	Serum Protein(g/Dl) Average	Range
1 CR6/19	23	51	44 - 63	-	-	6.55	5.0 - 8.5
2 CR7/17	30	46	40 - 52	0.104	.00 - .50	4.99	4.8 - 7.6
2 R6/19	30	58	48 - 67	-	-	6.86	5.0 - 9.0
2 R7/17	30	45	40 - 59	0.030	.00 - .10	5.96	5.2 - 5.7

Note: CR = clipped and relocated, R = resident

Body fat was recorded by visual observations using the fish health assessment key: 0 = no fat, 1 = little fat; where less than 50% of each caecum is covered, 2 = desirable fat; where 50% but less than 75% of each caecum is covered, 3 = excessive fat; where more than 75% but not all of the caecum is covered, and 4 = extreme fat; where all of the caeca are covered by fat. The average fat numbers for the relocated bass are recorded in table 8. The relocated fish show an increase in average fat number was 1.40 on 6/19 and 1.86 on 7/17 graph 6.

After the fish health assessment procedures the fish were ground in whole and sent to the state laboratory of hygiene for concentration analysis. The bass from 6/19 were split into ten samples of five fish each (for a total of 50) and the fish collected on 7/17 were split into nine samples of three fish each and one sample with one fish for a total of 28. Percent lipid and PCB concentrations were both analyzed and the average results are recorded in table 8. The clipped and relocated bass had an average of 4.5% lipid on 6/19 and 4.0% lipid on 7/17 (graph 7). PCB levels in the fish taken from above the dam on 6/19 were all below levels of detection (<0.200 ppm). After relocation and approximately one month the clipped and relocated fish showed a large increase in average PCB concentrations to 11.49 ppm (graph 8).

TABLE 8

LOCATION	N	Average Fat No.	Range Fat No.	Average %Lipid	Range %Lipid	Average PCB Conc.	Range PCBConc.
Above Dam Clipped & Relocated 6/19/92	10	1.40	1-2	4.15	3.8-4.7	<0.200	<0.200
Below Dam Clipped & Relocated 7/17/92	10	1.86	1-3	4.00	3.3-4.7	11.490	9.90-14.00

NOTE : ADCR6/19 has no detections for PCBs at 0.200 ppm or above. PCB LOD 0.200 ppm.

Resident Smallmouth Bass

Table 9 shows the initial and final physical status of the resident fish. The average resident fish weighed 26g on 6/19 and 33g on 7/17 which is a 21% increase in total average weight (graph 1). The average length of the resident fish increased by 10mm (8%) over the same time period (graph 2).

Table 9

LOCATION	N	Average Wt.(gm)	Range Wt.(gm)	Average Ln.(mm)	Range Ln.(mm)	Average (CF)	Range (CF)
Below Dam Resident 6/19/92	30	26	13.8-59.7	124	105-159	1.338	1.066-1.512
Below Dam Resident 7/17/92	30	33	19.8-64.6	134	166-177	1.353	1.197-1.634

Table 9 shows the average and range of condition factors for the resident bass. Average condition factor values increased by 0.014 (1.5%) from 6/19 to 7/17 (graph 3).

Each collected fish was examined by rating fins for fraying, erosion, hemorrhaging, and parasites. Table 5 shows the data from 160 observations on twenty fish taken from the below dam site on 6/19. Fifty three percent had normal conditions. Fraying was present on the remaining 47% of the fins.

Table 6 shows results on 240 fin observations on 30 relocated fish taken from the downstream site on 7/17. Sixty one percent showed normal condition, fraying was present on 39%, and 3% had parasites.

Table 4 shows that the twenty fish representative of the resident fish from 6/19 had 100% normal characteristics for all features except for gills, liver, and gallbladder. Fish number 26 had parasites present in it's gills. Liver observations showed 17% had parasites and 17% had focal discoloration. The gall bladders for these fish were full with a light green color except for fish number 7 which had an empty gallbladder.

Table 6 shows that 3% of the resident fish from 7/17 had pale gills. Body cavity observations showed that 40% had adhesions present. Thirty seven percent of the smb had parasites present in their spleens and 6% showed positive signs of a pale and shrunken spleen. Liver observations had only 27% of the smb with normal characteristics. Parasites were present in 73% of the fishes livers and 7% were pale in color. Gall bladders of the sampled bass were empty in 10% of the fish and full in 7%. The remaining 83% were full with an amber to straw color.

The average hematocrit values for the resident bass (table 7) were 58% on 6/19 and 45% on 7/17 which is a 29% decrease in average percent volume (graph 4).

Table 7 shows leucocrit values obtained for the resident bass (note: values were not obtained for the 6/19 fish).

Average serum protein levels for the resident fish were 6.86 g/dl on 6/19 and 5.96 on 7/17 (graph 5).

The average fat numbers for the resident bass are recorded in table 10. The fish show an increase in average fat number from 1.00 (6/19) to 1.77 (7/17) which is a 44% increase (graph 6).

Table 10

LOCATION	N	Average Fat No.	Range Fat No.	Average %Lipid	Range %Lipid	Average PCB Conc.	Range PCBConc.
Below Dam Resident 6/19/92	7	1.00	0-3	3.84	23.-5.5	11.957	8.70-15.00
Below Dam Resident 7/17/926	10	1.77	1-3	4.82	3.8-9.0	19.100	15.00-24.00

The resident bass from 6/19 were split into 7 samples of 1 to 5 fish each for a total of 30 and the fish collected on 7/17 were split into 10 samples of 3 fish each for a total of 30. Percent lipid and PCB concentrations were both analyzed and the results are recorded in table 10. The resident bass had an average of 3.84% lipid on 6/19 and 4.82% on 7/17 (graph 7). PCB levels in the fish taken from below the dam on 6/19 had an average of 11.957 ug/g and increased to 19.100 ug/g on 7/17.

Golden Redhorse

Table 11 shows the physical status for the sampled Golden Redhorse including weight, length, and condition factor.

Table 11.

Species	N	Average Weight	Range Weight	Average Length	Range Length	Average CF	Range CF
Golden Redhorse	7	786	590-986	410	380-450	1.138	1.075-1.220

Each collected fish was examined by rating fins for fraying, erosion, hemorrhaging, lesions, and parasites. Table 12 has data from 49 observations on 7 fish. Sixty three percent of the observed fins showed no signs of any degenerative features. Erosion was present on 6% of the fins, 28% had fraying, 10% had hemorrhaging, and 10% showed positive signs of lesions.

Table 12 also shows that the seven fish representative of the Golden Redhorse population below the kohler dam had 100% normal characteristics for the following features; eyes, operculum, gills, psuedobranch and thymus. Body cavity observations had 86% of the collected fish with adhesions. The gall bladders for these fish were full with a light green color except for fish number three which had an empty gall bladder. The livers of the seven fish were all normal except fish 5 had a fatty deposit and fish 4 had a parasite. All spleens were normal, except for one parasite found on fish number three. Kidneys of the Golden Redhorse had one with a swollen and convex shape and two with a pale color.

The average hematocrit, leucocrit, and serum protein values for the Golden Redhorse are recorded in table 13.

Table 13

Fish Species	Hematocrit(%pcv) Average	Hematocrit(%pcv) Range	Leucocrit(%pcv) Average	Leucocrit(%pcv) Range	Serum Protein(g/Dl) Average	Serum Protein(g/Dl) Range
Golden Redhorse	40.0	31.5 - 47.1	1.10	0.50 - 2.2	3.7	2.9 - 4.1

The averages and ranges for body fat number, percent lipids and PCB concentrations are recorded in table 14.

Table 14.

Fish Species	Average Fat No.	Range Fat No.	Average %Lipid	Range %Lipid	Average PCB Conc.	Range PCB Conc.
Golden Redhorse	2.4	1 - 3	3.6	3.2 - 4.0	27	17 - 33

SUMMARY

In comparing the two groups of fish, clipped and relocated to resident it should be noted that no conclusions can be made until statistical analysis is completed. Therefore we can only note if the values are higher or lower and use these in comparisons.

Average weights of the smb increased by 19% over the sample periods for the clipped and relocated fish when compared to the average weights of the resident smb (graph 1). Average total lengths for the clipped and relocated fish also increased but only by 8% (graph 2). This smaller increase in total length for the clipped and relocated fish results in a decrease of average CF values while the resident fish average CF values increase (graph 3).

Blood results were only graphed for hematocrit and serum values because leucocrit values were only obtained for half the samples. Average hematocrit values decreased for both groups of fish over the sample time period (graph 4). Resident fish showed a 15.5% greater decrease in percent packed cell volume of hematocrits over the clipped and relocated fish for the same time period. Serum protein levels also decreased for both sample groups of fish. Resident fish showed a 16% greater decrease than did the clipped and relocated fish (graph 5).

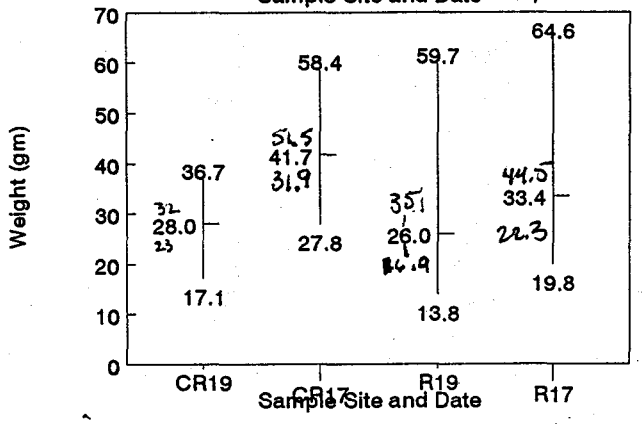
Graph 6 shows the average fat number values for the clipped and relocated and resident smb. The resident fish show a 44% greater increase in average fat number value over the clipped and relocated fish. Graph 7 shows that average percent lipids of the whole fish increased for the resident smb by 25% while the clipped and relocated bass has a 4% decrease in average percent lipids.

Finally graph 8 shows the large difference in PCB concentrations for the sampled fish. The clipped and relocated fish had approximately a 98% increase in total average PCB concentrations while the resident fish had a 38% increase in average PCB concentrations.

Golden Redhorse were also collected and analyzed with the same techniques as the small mouth bass. Even though no comparison can be made between the two species this data may be useful for future examinations

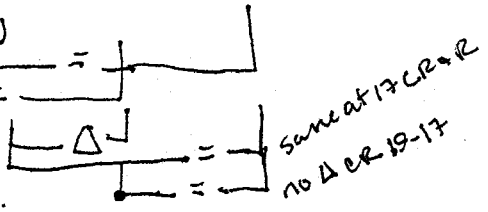
by

Average and Range for Weight per Sample Site and Date



↑CR w/ time → relocate

Same at beginner end of R

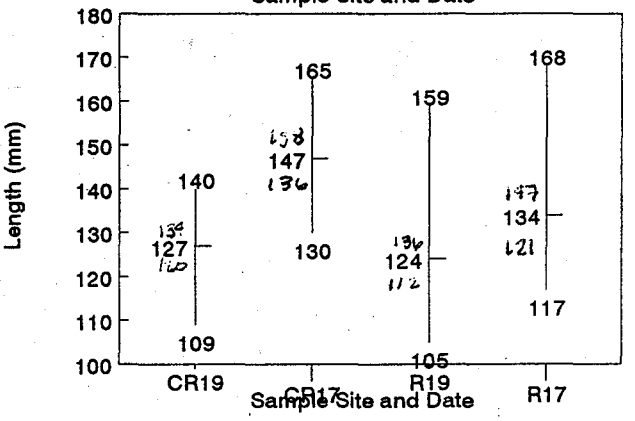


- started same
- CR ↑ w/ time + relocate
- R no Δ w/ time
- CR + R ended the same

by

Graph 2

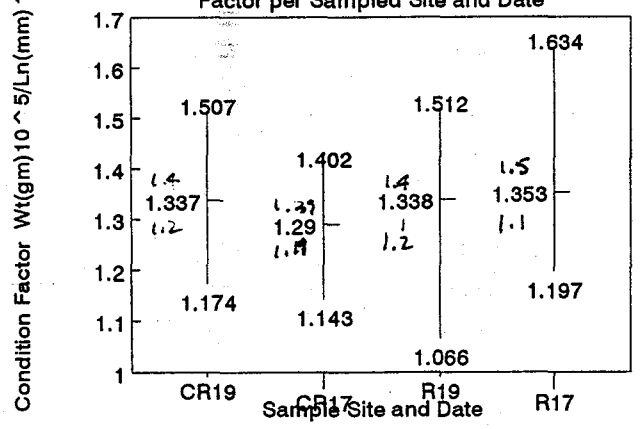
Average and Range for Length per Sample Site and Date



- started same
- CR ↑ w/ time + location
- R did not ↑ w/ time + location
- CR & R ended almost same

Graph 3

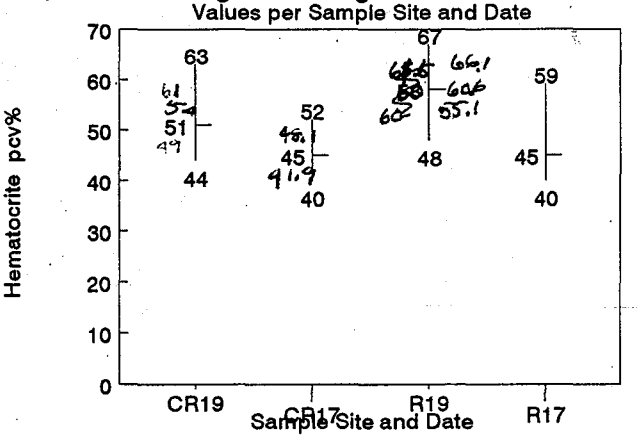
Average and Range for Condition Factor per Sampled Site and Date



- Started same
- CR CF ↓ w/ time → relocate
- R CF no change w/ time
- CR + R ~~stay~~ end ≈ same

Graph 4

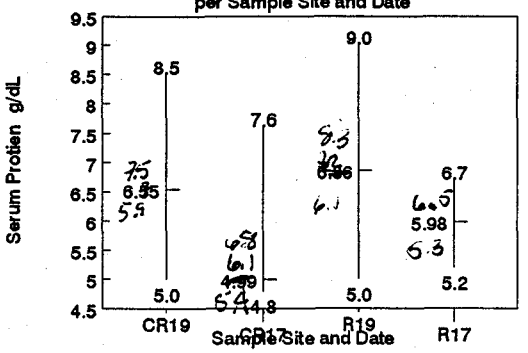
Average and Range for Hematocrite Values per Sample Site and Date



- started ≈ same
- both ↓ w/ time
- ended ≈ same

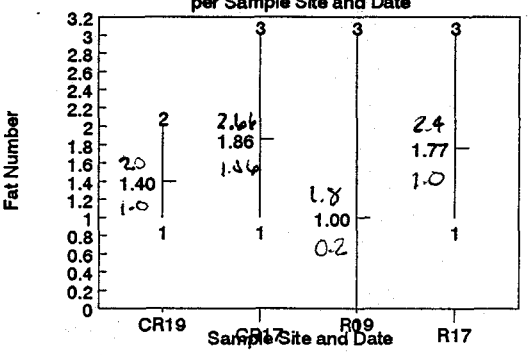
DRAFT

Graph 5 Average and Range for Serum Protien
per Sample Site and Date



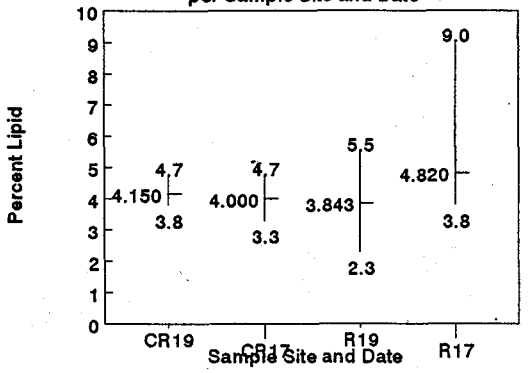
- started the same
- both ↓ at time, relative
- ended the same

Graph 6 Average and Range for Fat Number
per Sample Site and Date

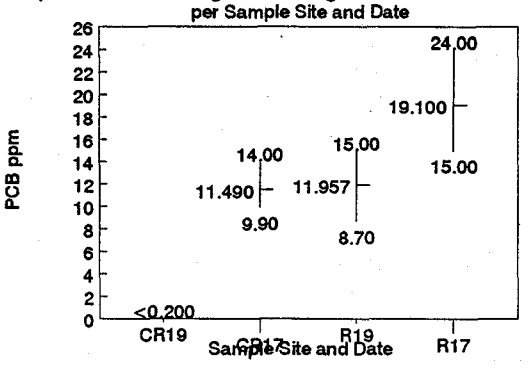


- started the same
- both ↑, but not as much
- ended the same

Graph 7 Average and Range for Percent Lipid
per Sample Site and Date



Graph 8 Average and Range for PCBs
per Sample Site and Date



DRAFT

Smallmouth Bass Quality Assessment
Sheboygan R.

FISH HATCHERY QUALITY ASSESSMENT CODES

7/12

Sheboygan
92120 & 92122

need to add to data base

1. FINS: – spiny / fleshy

spiny dorsal
fleshy dorsal
left pectoral
right pectoral
left pelvic
right pelvic
upper caudal
lower caudal

erosion:
0 = no erosion
1 = less than 1/3 of fin eroded
2 = more than 1/3 but less than 2/3 eroded
3 = more than 2/3 eroded

damage/pathology:
F = fraying
H = hemorrhaging
FH = both fraying and hemorrhaging
L = lesion
PS = parasite

→ Do Sims for 92126 92121 92122

2. EYES:
N = both eyes normal
B1 = blind in one eye (this code is used when an eye has been wounded andhealed over)
B2 = blind in both eyes
E1 = exophthalmic ("popeye") in one eye
E2 = exophthalmic in both eyes
H1 = hemorrhagic (bleeding) in one eye
H2 = hemorrhagic in both eyes
M1 = missing one eye
M2 = missing both eyes
C1 = cataract in one eye
C2 = cataracts in both eyes
→ PS1/PS2 parasite

3. OPERCULUMS:
N = both operculums normal
A1 = one abbreviated operculum
A2 = both operculums abbreviated

4. GILLS:
N = normal (rich red color, free of excessive mucus, etc.)
E = edematous (swollen gills)
F = frayed (separation of gill filaments)
C = clubbed (a condition caused by protozoan infestations, bacterial infections, or irritating chemicals or other factors)
M = marginate (a breakdown and/or fusing of the tips of the filaments due to columnaris disease or other factors)
P = pale (frequently an indication of anemia)
→ PS= parasite

5. PSUEDOBRANCHS:
N = normal
1 = mild inflammation
2 = severe inflammation
3 = lithic

6. THYMUS:
N = normal
1 = mild inflammation
2 = severe inflammation

9/20 to 9/2

7. BODY CAVITY

N = normal
1 = ascites (blood-tinged fluid)
2 = clear fluid
3 = hemorrhaging
4 = adhesions

need to add to data base →

8. MESENTERIC FAT:

0 = none
+1 = little fat; where less than 50% of each caecum is covered
+2 = desirable amount; where 50%, but less than 75% of each caecum is covered
+3 = excessive fat; where more than 75% but not all of the caecum is covered
+4 = extreme fat; where all of the caecae are covered by fat

9. SPLEEN:

PS = parasite

N = normal, red
B = black
G = granular (a "pebbly appearance")
E = enlarged
P = pale / shrunken
PS = parasite →

10. LIVER:

N = normal
P = pale
F = fatty liver; coffe with cream colored; greasy to feel
ND = nodules in the liver
FD = focal discoloration
S = slight general discoloration
PS = parasite →

11. GALL BLADDER:

1 = empty fish eaten in last few hrs
2 = full; light green/yellow → fish ate in last day & week
3 = full; green to black ate in last week or longer
4 = amber; straw colored (reddish) – fish ate in last couple days

12. KIDNEYS:

N = normal, concave surface
S = swollen, convex surface
M = mottled
G = granular
U = urolithiasis (a calcification of the tubules equivalent to kidney stones)
P = pustules
PS = parasite PL = pale →

13. HIND GUT

N = normal
1 = mild inflammation
2 = severe inflammation

→ T = Tumors (on separate sheet)

change sex

FISH HEALTH ASSESSMENT
NECROPSY DATA

PAGE 1 of 1
DATE 7/17/92

Quality Control Assessment No. 92120
Species Smallmouth-relocated, clipped
Lot Number
Sample Size
Remarks

Strain
Age of Fish 1 year
No. Fish/Lot

Station below Kohler Dam; Sheboygan River
Water Temp. 70
No. Pools Sampled
Investigators Nelson, O'Malley, Marcq, Schrank, et al.

Fish ~~Smpl~~ No.	Sex	TL mm	Wgt gm	SD	FD	LP	RP	LPl	~~RPl~~	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Blood Hmt	Leu	SPrt
1	F	154	49.8	0	0	0	0	0		0F	0F	N	N	N	N	N	N	2	N	N	2/4	n	n	47.9	0.1	5.3
2	nF	142	39.5	0	0	0	0	0F		0F	F1	N	N	N	N	N	n	1	n	n	2/4	n	n	44	.1	5.5
3	nF	160	53.0	0	0	0	0	0		0F	0F	N	N	N	N	N	4	1	n	n	2/4	n	n	47.5	0	6.4
4	un	147	36.3	0	0	0	0F	0F		0F	0	N	N	N	N	N	4	1	n	n	2/4	n	n	47	0	4.8
5	nF	135	31.1	0	0F	0	0	0		0F	0F	N	N	N	N	N	n	2	n	n	2/4	n	n	50	0	6.3
6	nF	155	48.0	0	0	0F	0	0		0	0F	n	n	n	n	n	4	2	n	n	2/4	n	n	40.5	0	5.2
7	nF	159	53.9	0	0F	0	0	0F		0	0F	n	n	n	n	n	4	2	n	n	2/4	n	n	42.5	.5	5.8
8	nF	133	28.1	0	0	0	0	0		0F	0F	n	n	n	n	n	n	1	n	n	2/4	n	n	41	0	5.5
9	un	132	31.5	0	0	0	0	0		0F	0F	n	n	n	n	n	4	1	n	n	2/4	n	n	46	.5	No Reading
10	nF	163	54.4	0F	0	0F	0	0F		0	0	n	n	n	n	n	4	2	n	n	2/4	n	n	48.8	.1	No Reading
dead 11	*M	163	56.4	0	0F	0	0	0F		0F	0F	N	N	N	N	N	N	3	N	P	2/4	N	N	No	Sample	Tkn
12	MF	132	44.9	0	0	0	0	0		0F	0	N	N	N	N	N	4	2	N	N	2/4	N	N	43	.1	6.0
13	MF	142	34.3	0	0F	0	0	0		0	0	N	N	N	N	N	4	2	N	N	2/4	N	N	47	.1	6.0
14	MF	132	27.8	0	0	0	0	0F		0F	0	N	N	N	N	N	4	1	N	N	2/4	N	N	46.8	.1	5.2
15	MF	130	26.1	0	0F	0	0	0		0F	0	N	N	N	N	N	N	3	N	N	2/4	N	N	47	.2	5.1
16	FM	162	56.1	0	0	0	0	0		0F	0F	n	n	n	n	n	N	2	n	n	2/4	n	n	44.5	0	7.1
17	nF	160	49.1	0	0F	0	0	0		0	1F	n	n	n	n	n	n	2	n	n	2/4	n	n	44	0	5.8
18	FM	158	55.3	0	0	0	0	0		0F	0F	n	n	n	n	n	4	2	n	n	2/4	n	n	44	0.1	6.5
dead 19	FM	143	37.4	0	0F	0	0	0		0F	0F	n	n	n	n	n	n	1	n	PS	2/4	n	n	No	Sample	
20	FM	140	34.1	0	0	0	0	0		0	0F	n	n	n	n	n	4	3	n	n	2/4	n	n	52	0	6.6
21	nF	141	37.8	0	0F	0	0	0		0	0F	n	n	n	n	n	n	3	n	n	2/4	N	N	39.5	.1	6.5
22	nF	149	40.1	0	0F	0	0	0		0F	0	n	n	n	n	n	n	2	n	n	2/4	n	n	46.1	.1	5.8
23	nF	147	38.8	0	0	0F	0	0F		0F	0F	n	n	n	n	n	n	3	n	n	2/4	n	n	48	0	7.6
24	nF	165	57.2	0	0	0	0	0		0F	0F	n	n	n	n	n	4	3	n	n	2/4	n	n	43.5	.1	7.4
dead 25	FM	136	33.8	0	0F	0F	0	0		0F	0F	n	n	n	n	n	n	1	n	n	2/4	n	n			
26	Bouins																									
27	Bouins																									
28	MF	145	39.9	0	0	0	0	0		0F	0F	N	N	N	N	N	N	1	N	N	2/4	N	N	45.8	0	6.5
29	FM	150	38.6	0	0	0	0F	0F		0F	0F	N	N	N	N	N	4	2	N	N	2/4	N	N	41.8	.1	6.3
30	FM	133	33.9	0	0	0	0	0		0	0F	N	N	N	N	N	N	1	N	PS	2/4	N	N	48.5	0	6.4

F: organs wider at post... [illegible]
M: organs same width [illegible]

* took gonad
(19) PS is possible

~~[sex needs to be verified]~~

7/17/92 Clipped

Fish Composits

Sequence Lab #	Fish #
9211 →	1-3
9212 →	4-6
9213 →	7-9
9214 →	10-12
9215 →	13-15
9216 →	16-18
9217 →	19-21
9218 →	22-24
9219 →	25, 28, 29
9220 →	30

FISH HEALTH ASSESSMENT
NECROPSY DATA

Lab # 605002

PAGE 1 of 1
DATE 7/17/92

☐ Quality Control Assessment No. 92121

Species Smallmouth - resident
Lot Number
Sample Size
Remarks

Strain
Age of Fish 1 year
No. Fish/Lot

Station below Kohler Dam, Sheboygan River
Water Temp. 70°F
No. Pools Sampled
Investigators Nelson, Margetis

Smpl No.	Sex	TL mm	Wgt gm	Condition of Fins								Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Blood		
				SD	FD	LP	RP	LPl	RPl	UC	LC													Hmt	Leu	SPrt
P 1	F	123	25.5	0	OF	0	0	0	0	OF	0	N	N	P	N	N	N	1	N	PS	2,4	N	N	Not Taken		
D 2	F	130	30.8	0	0	OF	0	0	0	OF	OF	N	N	P	N	N	4	3	P	PS	1	S	N	"	"	
D 3	FM	130	30.7	0	OF	OF	0	0	0	OF	OF	N	N	P	N	N	4	1	N	PS	2,4	N	N	"	"	
D 4	F	125	26.5	0	0	0	0	OF	0	OF	0	N	N	P	N	N	4	1	PS	PS	2,4	N	N	"	"	
*D 5	F	137	34.0	0	0	0	OF	0	0	OF	OF	N	N	P	N	N	4	1	N	PS	2,4	N	N	"	"	
D 6	F	118	20.3	0	OF	OF	0	0	0	OF	OF	N	N	P	N	N	4	1	N	PS	2,4	N	N	"	"	
D 7	F	133	28.6	0	0	0	0	0	OF	OF	OF	N	N	P	N	N	4	2	N	PS	2,4	PL	N	"	"	
D 8	FM	136	34.7	0	OF	OF	OF	0	0	OF	OF	N	N	P	N	N	4	2	PS	PS	2,4	N	N	"	"	
9	F	131	30.2	0	0	0	0	OF	0	OF	0*	N	N	N	N	N	4	2	N	P,PS	2,4	N	N	58.5	.1	6.6
10	F	160	57.9	0	0	0	0	OF	OF	OF	OF	N	N	N	N	N	4	1	P	N	2,4	N	N	44	0	6.2
D 11	F	127	28.6	OF	0	0	OF	0	0	0	0	N	N	P	N	N	N	2	N	PS	2	N	N	Not Taken		
12	F	163	57.3	0	0	OF	0	0	0	OF	OF	N	N	N	N	N	4	1	PS	PS	2	N	N	49	0	6.6
13	F	125	25.5	0	OF	0	0	0	0	OF	0	N	N	N	N	N	N	2	N	PS	2,4	N	N	48.5	.1	5.2
14	F	139	30.5	0	0	0	0	0	OF	OF	0	N	N	N	N	N	N	1	PS	PS	2	P	N	43.5	0	5.7
15	M	117	20.2	0	OF	OF	OF	OF	0	OF	OF	N	N	N	N	N	N	1	PS	P,PS	2,4	N	N	43.9	0	5.6
16	F	140	34.3	0	0	0	OF	0	0	OF	OF	N	N	N	N	N	4	2	N	PS	1	P	N	48	0	5.7
17	F	168	64.6	0	0	OF	0	0	0	0	OF	N	N	N	N	N	N	3	PS	PS	1	S	N	49.5	0	6.7
18	F	140	35.0	0	OF	0	0	0	0	OF	OF	N	N	N	N	N	4	2	N	N	2,4	S	N	48	0	5.3
19	F	132	31.5	0	OF	0	0	0	0	OF	OF	N	N	N	N	N	N	2	PS	PS	2,4	N	N	41.5	.2	5.8
** 20	F	126	26.2	**F	0	0	0	OF	0	OF	OF	N	N	N	N	N	N	2	N	PS	2,4	N	N	46.5	0	6.2
21	F	140	33.9	0	F	F	0	0	F	F	F	N	N	N	N	N	N	3	N	N	2,4	N	N	40	.1	5.0
22	F	140	33.4	0	0	0	0	0	0	F	F	N	N	N	N	N	N	1	N	N	2,4	N	N	40	.1	6.6
23	F	135	34.3	0	0	0	0	0	0	F	F	N	N	N	N	N	N	1	N	PS	2,4	N	N	41	0	6.4
24	F	144	36.4	0	0	0	0	F	F	0	F	N	N	N	N	N	N	3	PS	PS	2,4	N	N	42	0	6.0
25	FM	142	39.7	0	0	F	0	F	F	0	F	N	N	N	N	N	N	3	N	N	N	N	N	45.5	0	6.8
26	F	118	19.8	0	0	0	F	F	0	F	F	N	N	N	N	N	N	2	N	N	2,4	N	N	46	0	5.9
27	F	117	21.7	0	0	F	0	0	0	F	F	N	N	N	N	N	N	2	PS	PS	2,4	N	N	44.5	0	5.3
D 28	F	130	26.3	0	0	0	0	0	F	F	F	N	N	N	N	N	N	2	N	N	2,4	N	N	Not Taken		
D 29	FM	130	29.4	0	0	F	0	0	0	0	F	N	N	N	N	N	N	1	PS	PS	2,4	N	N	"	"	
D 30	F	139	35.9	0	F	0	0	0	0	F	F	N	N	N	N	N	N	2	N	N	2,4	N	N	"	"	

* Tissue for sex organs ** abrasion on dorsal fin post for histopathology

31, r 32 Preserved in Bouin Solution

unclipped

Fish #	Tissue #
1-3	9201
4-6	9202
7-9	9203
10-12	9204
13-15	9205
16-18	9206
19-21	9207
22-24	9208
25-27	9209
28,29	9210

Quality Co
Species
Lot Numl
Sample

FP = Ulcer (HL) 1 = light 3 = severe

FISH HEALTH ASSESSMENT
NECROPSY DATA

PAGE __ of __
DATE 7/17/92

Quality Control Assessment No. 92122
Species Golden Redhorse
Lot Number
Sample Size
Remarks Thymus-unsure location; no pyloric caeca; fat cover intestine for Fat

Strain
Age of Fish
No. Fish/Lot

Station below Kohler Dam Sheboygan River
Water Temp.
No. Pools Sampled
Investigators Nelson, Marg et al

Smpl No.	Sex	TL mm	Wgt gm	Condition of Fins SD	PD	LP	RP	LPl	RPl	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Blood Hmt	Leu	SPrt
1	M	408	818	0	3	H/L	0	0	0	0/F	0/F	N	N	N	N	N	4	2	N	N	2/4	N	N	33.5	1	4.1
* 2	M	380	590	0	1	H/L/F	0	0	0	0	0	N	N	N	N	N	4	2	N	N	2/4	N	N	47.1	1	4.0
* 3	M	415	814	OF	–	0	0	0	0	0	1	N	N	N	N	N	4	3	P	P	1	S	N	46.5	.5	3.5
X 4	F	450	986	0	2	0	0	0	0	HLF	OF	N	N	N	N	N	4	2	N	N	2,4	N	N	34.2	1	4.1
XX 5	F	417	808	0	–	0	OHLB	0	0	O/F	O/F	N	N	N	N	N	N	3	N	FD	2,4	PL	N	42.5	1	unreadable
6	M	412	792	OF	–	0	0	0	0	O/F	O/F	N	N	N	N	N	4	3	N	N	2,4	PL	N	44	1	unreadable
X 7	F	385	696	OF	3	0	0	H4/1	0	O/F	O/F	N	N	N	N	N	4	2	N	N	2,4	N	N	31.5	2	2.9

TISSUE BANK FISH #

2	9222
3	9223
5	9225
6	9226

Sent for PCB analysis

1	9221
4	9224
7	9227

* Hemorrage above RP & RPL
X Hemorrage in the anal fin
XX No [illegible] below fin
XXX Severe lesion on caudal peduncle.

(see reverse)

#5 Liver samples taken for histopathology

92121

Fish #	Tissue # for PBC Analysis
1-3	9201
4-6	9202
7-9	9203
10-12	9204
13-15	9205
16-18	9206
19-21	9207
22-24	9208
25-27	9209
28, 29	9210

Smallmouth Bass Quality Assessment 9293
Sheboygan R. 6/19 9294

FISH HATCHERY QUALITY ASSESSMENT CODES

need to add to data base

1. FINS: – spiny / fleshy

erosion:
0 = no erosion
1 = less than 1/3 of fin eroded
2 = more than 1/3 but less than 2/3 eroded
3 = more than 2/3 eroded

damage/pathology:
F = fraying
H = hemorrhaging
FH = both fraying and hemorrhaging
PS = parasite

2. EYES:
N = both eyes normal
B1 = blind in one eye (this code is used when an eye has been wounded or wounded andhealed over)
B2 = blind in both eyes
E1 = exophthalmic ("popeye") in one eye
E2 = exophthalmic in both eyes
H1 = hemorrhagic (bleeding) in one eye
H2 = hemorrhagic in both eyes
M1 = missing one eye
M2 = missing both eyes
C1 = cataract in one eye
C2 = cataracts in both eyes
PS1/PS2 parasite

3. OPERCULUMS:
N = both operculums normal
A1 = one abbreviated operculum
A2 = both operculums abbreviated

4. GILLS:
N = normal (rich red color, free of excessive mucus, etc.)
E = edematous (swollen gills)
F = frayed (separation of gill filaments)
C = clubbed (a condition caused by protozoan infestations, bacterial infections, or irritating chemicals or other factors)
M = marginate (a breakdown and/or fusing of the tips of the filaments due to columnaris disease or other factors)
P = pale (frequently an indication of anemia)
PS = parasite

5. PSUEDOBRANCHS:
N = normal
1 = mild inflammation
2 = severe inflammation
3 = lithic

6. THYMUS:
N = normal
1 = mild inflammation
2 = severe inflammation

Sheboygan 1992 FISH

9293

7. BODY CAVITY

N = normal
1 = ascites (blood-tinged fluid)
2 = clear fluid
3 = hemorrhaging
4 = adhesions

need to add to data base →

8. MESENTERIC FAT:

0 = none
+1 = little fat; where less than 50% of each caecum is covered
+2 = desirable amount; where 50%, but less than 75% of each caecum is covered
+3 = excessive fat; where more than 75% but not all of the caecum is covered
+4 = extreme fat; where all of the caecae are covered by fat

9. SPLEEN:

PS = parasite

N = normal, red
B = black
G = granular (a "pebbly appearance")
E = enlarged
P = pale / shrunken
PS = parasite →

10. LIVER:

N = normal
P = pale
F = fatty liver; coffe with cream colored; greasy to feel
ND = nodules in the liver
FD = focal discoloration
S = slight general discoloration
PS = parasite →

11. GALL BLADDER:

1 = empty
2 = full; light green
3 = full; green to black
4 = amber; straw colored (reddish)

12. KIDNEYS:

N = normal, concave surface
S = swollen, convex surface
M = mottled
G = granular
U = urolithiasis (a calcification of the tubules equivalent to kidney stones)
P = pustules
PS = parasite →

13. HIND GUT

N = normal
1 = mild inflammation
2 = severe inflammation

→ T = Tumors (on separate sheet)

D: FS = parasites
T? = possible tumor

HATCHERY FISH HEALTH ASSESSMENT
NECROPSY DATA

DATE 6/19/92

Store # H. 605037

QUALITY CONTROL ASSESSMENT NO. 9293
SPECIES Small mouth bass
LOT NUMBER
SAMPLE SIZE 20
REMARKS Fish ~~21-59~~ 1-24 to ~~50~~ 53 were collected and frozen. were collected & frozen & on hold at Jim's freezer

STRAIN
AGE OF FISH 1 yr.
NO. FISH IN LOT
STATION Sheboygan R. upstream
WATER TEMP. ~70°F
NO. POOLS SAMPLED
INVESTIGATORS Emily / Sue

Spl No.	Sex	TL mm	Wgt gm	CONDITION OF FINS: D	LP	RP	LPl	RPl	CU	CL	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	BLOOD: Hmt	Leu	SPrt
1	M	119	22.3	D	D	D	D	D	D	D	N	N	N	N	N	N	+1	N	N	2	N	N	47		6.
2	M	127	28.3	D	D	D	DF	D	DF	D	N	N	N	N	N	N	+1	N	N	2	N	N	53		7.8
3	M	130	29.5	D	D	D	D	D	DF	D	N	N	N	N	N	N	+1	N	N	2	N	N	56		7.2
4	M	126	26.5	D	D	D	D	D	D	IF	N	N	N	N	N	N	+1	N	N	2	N	N	59		7.2
5	M	121	23.7	D	DF	D	D	D	D	DF	N	N	N	N	N	N	+1	N	N	2	N	N	52		7
6	M	130	33.1	D	D	DF	D	D	D	D	N	N	N	N	N	N	+2	N	N	2	N	N	52		6.5
7	M	131	32.1	D	D	D	DF	D	DF	D	N	N	N	N	N	N	+2	PS	N	2	N	N	56		6.5
8	M	140	36.7	D	D	D	D	D	D	D	N	N	N	N	N	N	+1	N	N	2	N	N	48		6.5
9	M	125	25.1	D	D	D	D	D	D	D	N	N	N	N	N	N	+1	N	N	2	N	N	58		7
10	M	136	31.3	D	DF	D	D	D	DF	D	N	N	N	N	N	N	+1	N	N	2	N	N	54		7
11	M	130	29.7	D DF	DF	D	D	D	D	D	N	N	N	N	N	N	+2	N	N	2	N	N	62		7.5
12	M	134	33.6	D DF	DF	D	D	D	DF	DF	N	N	N	N	N	N	+1	N	N	2	N	N	57		7
13	M	115	19.1	D DF	D	D	D	D	DF	D	N	N	N	N	N	N	+1	N	N	2	N	N	No Blood Sample		
14	M	127	29.2	D DF	D	D	DF	D	D	DF	N	N	N	N	N	N	+2	N	PS	2	N	N	63		8.5
15	M	109	17.1	D DF	D	DF	D	D	D	DF	N	N	N	N	N	N	+1	N	N	2	N	N	57		6.2
16	M	126	28.4	D	D	D	D	D	D	DF	N	N	N	N	N	N	+2	N	N	2	N	N	46		5.5
17	M	131	26.4	D DF	DF	D	D	D	D	DF	N	N	N	N	N	N	+2	N	N	2	T?	N	50		5
18	M	130	27.8	D DF	D	D	D	D	D	DF	N	N	N	N	N	N	+3	N	N	2	N	N	50		6
19	M	122	22.8	D DF	DF	D	DF	D	DF	D	N	N	N	N	N	N	+1	N	N	2	N	N	52		6.2
20	M	134	32.8	D DF	D	DF	D	D	D	DF	N	N	N	N	N	N	+1	N	N	2	N	N	54		6.5
21																							46		6.0
22																							44		6.0
23																							47		5.0
24			95.5																						
25			19g																						
26																									
27																									
28																									
29			109.5																						
30			21.8																						

Spl No. 1 Composite
Spl No. 2 Composite
Spl No. 3 Composite
Spl No. 4 Composite
Spl No. 21-23 histopath

605037

Lab #	Fish #	6/19/92 weight ave of 5 grams - Average	length mm	
	24		11.5	
	25		11.3	
9205	26	19.1	10.7	11.0 (0.6)
	27		11.7	
	28		10.3	
	29		12.4	
	30	109.5	12.4	
9206	31		10.6	11.7 (0.7)
	32	21.8	11.6	
	33		11.6	
	34		12.5	
	35	forgot	12.0	
9207	36	to	13.0	12.6 (0.9)
	37	weigh!	12.7	
	38		12.7	
	39		12.2	
	40	135/5	12.1	
9208	41		12.7	12.4 (0.3)
	42	27.0	12.4	
	43		12.6	
	44		13.2	
	45	132/5	12.9	
9209	46		12.8	12.9 (0.2)
	47	30.4	12.7	
	48		12.9	
	49		13.6	
	50	192/5	14.6	
9210	51		~~13.5~~	14.5
	52		~~13.5~~	14.5
	53	38.4	13.2	
			~~14.5~~	

14.1 (0.6)

PCB Analysis
Fish Sequence

6/19/92

Fish #		Sequence #
1 - 5	→	9201
6 - 10	→	9202
11 - 15	→	9203
16 - 20	→	9204
24 - 28	→	9205
29 - 33	→	9206
34 - 38	→	9207
39 - 43	→	9208
44 - 48	→	9209
49 - 53	→	9210

Parasite.
S = Swollen
H = Hemolyzed

HATCHERY FISH HEALTH ASSESSMENT
NECROPSY DATA

PAGE ___ of ___
DATE 6/19/92

QUALITY CONTROL ASSESSMENT NO. 9294
STATION Sheboygan R. below Kohler dam Storet #605002
SPECIES Small mouth bass
STRAIN ___
WATER TEMP. 70°F
LOT NUMBER ___
AGE OF FISH 1 yr
NO. POOLS SAMPLED ___
SAMPLE SIZE 30
NO. FISH IN LOT ___
INVESTIGATORS Emily / Sue
REMARKS Accidentally lost the blood samples for fish 1-20. Fish 11-20 were wrapped & frozen. Fish 31-35 were fixed in Bouins & also blood was collected for Hmt & SPrt.

Hemolyzed

Spl No.	Sex	TL mm	Wgt gm	CONDITION OF FINS (caudal / anal) D	LP	RP	LPl	RPl	CU	CL	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	BLOOD Hmt	Leu	SPrt
1	U	108	15.8	0 / OF	0	OF	0	0	0	OF	N	N	N	N	N	N	0	N	FD	2	N	N	~~1~~		
2	U	105	16.2	0	OF	OF	0	0	0	OF	N	N	N	N	N	N	0	N	N	2	N	N	~~1~~		
3	U	127	24.6	0	0	0	0	0	OF	0	N	N	N	N	N	N	1	N	FD	2	N	N			
4	U	145	39.4	0 / OF	0	0	0	0	OF	OF	N	N	N	N	N	N	3	N	FD	2	N	N			~~1~~
5	U	109	13.8	0 / OF	0	0	0	0	OF	OF	N	N	N	N	N	N	0	N	N	2	N	N	55		6
6	U	137	34.6	0 / OF	OF	OF	0	0	OF	OF	N	N	N	N	N	N	1	N	FD	2	N	N	54		6
7	U	109	16.1	0 / OF	0	0	0	0	OF	OF	N	N	N	N	N	N	0	N	N	1	N	N	60		8
8	U	107	16.7	0	0	0	0	OF	OF	OF	N	N	N	N	N	N	1	N	N	2	N	N	66		7
9	U	121	25.9	0 / OF	0	OF	0	0	OF	OF	N	N	N	N	N	N	1	N	PS	2	N	N	67		7
10	U	114	22.4	0 / OF	0	0	0	0	OF	OF	N	N	N	N	N	N	1	N	N	2	N	N	56		5.5
11	U	125	24.8																				No blood taken		
12	U	124	24.2	92 33																			62		8
13	U	115	19.8																				48		5.8
14	U	128	26.4																				55		6
15	U	159	59.7	92 34																			58		8
16	U	128	25.8																				49		5
17	U	129	27.8																						
18	U	133	33.0	92 35																					
19	U	120	24.7																						
20	U	117	21.1																						
21	U	137	35.1	0	0	0	0	0	0	0	N	N	N	N	N	N	1	N	N	2	N	N	54		7
22	U	138	38.8	0	0	0	0	0	0	0	N	N	N	N	N	N	2	N	N	2	N	N	62		8.2
23	U	118	21.1	0 / OF	0	0	0	0	0	OF	N	N	N	N	N	N	1	N	N	2	N	N	65		8
24	U	121	23.8	0 / OF	OF	0	0	0	0	OF	N	N	N	N	N	N	1	N	PS	2	N	N	67		9
25	U	120	24.9	0 / OF	0	0	OF	0	0	0	N	N	N	N	N	N	1	N	FD	2	N	N	55		6
26	U	131	31.0	0 / OF	0	OF	0	0	OF	OF	N	N	PS	N	N	N	2	N	N	2	N	N	54		6
27	U	115	20.6	0 / OF	0	OF	0	0	OF	OF	N	N	N	N	N	N	1	N	PS	2	N	N	60		8
28	U	126	28.6	0	Leech	0	0	0	0	OF	N	N	N	N	N	N	2	N	N	2	N	N	66		7
29	U	123	24.3	0	OF	0	0	0	0	OF	N	N	N	N	N	N	1	N	PS	2	S	N	67		7
30	U	115	20.8	0 / OF	0	OF	0	0	0	OF	N	N	N	N	N	N	0	N	PS	2	N	N	56		5.5

H = Hemolyzed

		Hmt	Spt
fixed 1 log path	31)	62	8
	32)	48	5.8
	33)	55	6.8
	34)	58	8 H
	35)	49	5

DBC Analysis

Fish #	Sequence #
1-5	9229
6-10	9230
11-14	9233
15	9234
16-20	9235
21-25	9231
26-30	9232

10 fish will be re-thawed re-weighed & put into composits of 5

FISH HEALTH ASSESSMENT - SUMMARY DATA

General Information

Date of Assessment 06/19/92 **Assessment Number** 9293
Location Sheboygan River, upstream of Kohler Dam **Storet Number** 605037
Species Smallmouth Bass, before clipping and relocation **Sample Size** 20
Collection Method stream shocker **Water Temperature**

Vital Statistics

	mean	range	sd	cv	count
Length					
Total	127 mm	109 - 140	7	6	20
Fork					
Weight	27.8 gm	17.1 - 36.7	5.0	18.1	20
Condition Index	1.3	1.2 - 1.5	0.1	7.7	20
Age	approx. 1 year				100% **distribution by age**
Sex	100 % unknown	__ % males	__% females		

Fin Condition

Fin Erosion Condition Index = 0.2

Non-caudal	0	0% Fish Affected
Caudal	0.8	5% Fish Affected

Percent of Fin Indices **Percent of Fish Pathology**

	Erosion 0	1	2	3	F	H	Ps	L	
Dorsal	100		0	0	0	45	0	0	0
Spiny	100		0	0	0	0	0	0	0
Fleshy	100		0	0	0	45	0	0	0
Upper Caudal	100		0	0	0	35	0	0	0
Lower Caudal	95		5	0	0	45	0	0	0
Right Pelvic	100		0	0	0	0	0	0	0
Left Pelvic	100		0	0	0	20	0	0	0
Right Pectoral	100		0	0	0	15	0	0	0
Left Pectoral	100		0	0	0	30	0	0	0

Anatomical Parameters

Intestinal Body Fat mean = 1.4 range = 1.0 - 3.0 **sd** = 0.6 **cv** = 42.9 n = 20

Percent Distribution of Fish Pathology

Eyes	N:100	B1: B2:	E1: E2:	H1: H2:	M1: M2:	C1: C2:	Ps1: Ps2:		
Operculums	N:100	A1: A2:							
Gills	N:100	E:	F:	C:	M:	P:	Ps:		
Pseudobranchs	N:100	1:	2:	3:	4:				
Thymus	N:100	1:	2:						
Body Cavity	N:100	1:	2:	3:	4:				
Mesenteric Fat	0:0	1:65	2:30	3:5	4:				
Spleen	Nr:95	Nb:	G:	E:	P:	Ps:5	Nd:		
Liver	N:95	P:	F:	Nd:	Fd:	Sd:	Ps:5		
Gall Bladder	0:	1:	2:100	3:	4:				
Kidney	N:95	S: (LESION??)	M:	G:	U:	P:	Ps:	P:	Pl:
Hind Gut	N:100	1:	2:						

Blood Characteristics

	mean	range	sd	cv	n
Hematocrit	54.0	46.0 - 63.0	4.7	8.8	19
Leucocrit					
Serum Protein	6.7	5 .0 - 8.5	0.8	12.2	19

Comments

These 20 plus 30 others analyzed for contaminant,. 3 fish perserved for histopath

FISH HEALTH ASSESSMENT
NECROPSY DATA

DATE 06/19/92

Quality Control Assessment No. 9293.0
Species Smallmouth Bass
Lot Number
Sample Size 20.0
Remarksfish 24-53 were collected and frozen

Strain
Age of Fish appx. 1 year
No. Fish/Lot
Storet # 605037

Station Sheboygan R. (upstream)
Water Temp. ~70 F
No. Pools Sampled
Investigators Emily, Sue

Smpl No.	Sex	TL mm	Wgt gm	CF	Condition of Fins								Physical Observations												Blood		
					SD	FD	LP	RP	LPl	RPl	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Hmt	Leu	SPrt
1.0	U	119	22.3	1.3	0	0	0	0	0	0	0	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	47.0	-	6.0
2.0	U	127	28.3	1.4	0	0	0	0	OF	0	OF	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	53.0	-	7.8
3.0	U	130	29.5	1.3	0	0	0	0	0	0	OF	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	56.0	-	7.2
4.0	U	126	26.5	1.3	0	0	0	0	0	0	0	1F	N	N	N	N	N	N	1.0	N	N	2.0	N	N	59.0	-	7.2
5.0	U	121	23.7	1.3	0	0	0F	0	0	0	0	0F	N	N	N	N	N	N	1.0	N	N	2.0	N	N	52.0	-	7.0
6.0	U	130	33.1	1.5	0	0	0	0F	0	0	0	0	N	N	N	N	N	N	2.0	N	N	2.0	N	N	52.0	-	6.5
7.0	U	131	32.1	1.4	0	0	0	0	OF	0	OF	0	N	N	N	N	N	N	2.0	PS	N	2.0	N	N	56.0	-	6.5
8.0	U	140	36.7	1.3	0	0	0	0	0	0	0	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	48.0	-	6.5
9.0	U	125	25.1	1.3	0	0	0	0	0	0	0	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	58.0	-	7.0
10.0	U	136	31.3	1.2	0	0	0F	0	0	0	OF	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	54.0	-	7.0
11.0	U	130	29.7	1.4	0	0f	0F	0	0	0	0	0	N	N	N	N	N	N	2.0	N	N	2.0	N	N	62.0	-	7.5
12.0	U	134	33.6	1.4	0	0f	0F	0	0	0	OF	OF	N	N	N	N	N	N	1.0	N	N	2.0	N	N	57.0	-	7.0
13.0	U	115	19.1	1.3	0	0f	0	0	0	0	OF	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N			
14.0	U	127	29.2	1.4	0	0f	0	0	OF	0	0	OF	N	N	N	N	N	N	2.0	N	PS	2.0	N	N	63.0	-	8.5
15.0	U	109	17.1	1.3	0	0f	0	0F	0	0	0	OF	N	N	N	N	N	N	1.0	N	N	2.0	N	N	57.0	-	6.2
16.0	U	126	28.4	1.4	0	0	0	0	0	0	0	OF	N	N	N	N	N	N	2.0	N	N	2.0	N	N	46.0	-	5.5
17.0	U	131	26.4	1.2	0	0f	0F	0	0	0	0	OF	N	N	N	N	N	N	2.0	N	N	2.0	T?	N	50.0	-	5.0
18.0	U	130	27.8	1.3	0	0f	0.0	0	0	0	0	OF	N	N	N	N	N	N	3.0	N	N	2.0	N	N	50.0	-	6.0
19.0	U	122	22.8	1.3	0	0f	0F	0	OF	0	OF	0	N	N	N	N	N	N	1.0	N	N	2.0	N	N	52.0	-	6.2
20.0	U	134	32.8	1.4	0	0f	0.0	0F	0	0	0	OF	N	N	N	N	N	N	1.0	N	N	2.0	N	N	54.0	-	6.5
ave		127	27.8	1.3															1.4						54.0		6.7
count		20	20.0	20.0															20.0						19.0		19.0
min		109	17.1	1.2															1.0						46.0		5.0
max		140	36.7	1.5															3.0						63.0		8.5
std		7	5.0	0.1															0.6						4.7		0.8
cv		6	18.1	7.7															42.9						8.8		12.2

FISH HEALTH ASSESSMENT - SUMMARY DATA

General Information

Date of Assessment 06/19/92 **Assessment Number** 9294
Location Sheboygan River, downstream of Kohler Dam **Storet Number** 605002
Species Smallmouth Bass, resident **Sample Size** 20
Collection Method stream shocker **Water Temperature**

Vital Statistics

	mean	range	sd	cv	n
Length					
Total	123.5 mm	105 - 159	12.1	9.8	30
Fork					
Weight	26.1 gm	13.8 - 59.7	9.1	35.1	30
Condition Index	1.3	1.1 - 1.5	0.1	7.2	30
Age	approx. 1 year			100% distribution by age	
Sex	100% unknown	__ % males __% females			

Fin Condition

Fin Erosion Condition Index = 0

Non-caudal	0	0% Fish Affected
Caudal	0	0% Fish Affected

Percent of Fin Indices					**Percent of Fish Pathology**			
	Erosion 0	**1**	**2**	**3**	**F**	**H**	**Ps**	**L**
Dorsal	100	0	0	0	65	0	0	0
Spiny	100	0	0	0	0	0	0	0
Fleshy	100	0	0	0	65	0	0	0
Upper Caudal	100	0	0	0	55	0	0	0
Lower Caudal	100	0	0	0	80	0	0	0
Right Pelvic	100	0	0	0	5	0	0	0
Left Pelvic	100	0	0	0	5	0	0	0
Right Pectoral	100	0	0	0	35	0	0	0
Left Pectoral	100	0	0	0	20	0	0	0

Anatomical Parameters

Intestinal Body Fat mean = 1.0 range = 0.0 - 3.0 sd = 0.8 cv = 79.5 n = 20

Percent Distribution of Fish Pathology

Eyes	**N:100**	**B1:**	**E1:**	**H1:**	**M1:**	**C1:**	**Ps1:**	
		B2:	**E2:**	**H2:**	**M2:**	**C2:**	**Ps2:**	
Operculums	**N:100**	**A1:**						
		A2:						
Gills	**N:95**	**E:**	**F:**	**C:**	**M:**	**P:**	**Ps:5**	
Pseudobranchs	**N:100**	**1:**	**2:**	**3:**	**4:**			
Thymus	**N:100**	**1:**	**2:**					
Body Cavity	**N:100**	**1:**	**2:**	**3:**	**4:**			
Mesenteric Fat	0:25	**1:55**	**2:15**	**3:5**	**4:**			
Spleen	**Nr:100**	**Nb:**	**G:**	**E:**	**P:**	**Ps:**	**Nd:**	
Liver	**N:50**	**P:0**	**F:0**	**Nd:0**	**Fd:25**	**Sd:0**	**Ps:25**	
Gall Bladder	**0:**	**1:5**	2:95	**3:**	**4:**			
Kidney	**N:95**	**S:5**	**M:**	**G:**	**U:**	**P:**	**Ps:**	**P:** **Pl:**
Hind Gut	**N:100**	**1:**	**2:**					

Blood Characteristics

	mean	range	sd	cv	n
Hematocrit	60.6	54.0 - 67.0	5.5	9.1	10
Leucocrit					
Serum Protein	7.2	5.5 - 9.0	1.1	15.7	10

Comments

These 20 plus 10 others analyzed for contaminant,. 5 fish perserved for histopath

Dam (Resident) 6-19-92 FISH HEALTH ASSESSMENT PAGE __ of __

NECROPSY DATA DATE 6/19/92

Quality Control Assessment No. 9294.0 Station oygan R. below Kohler dam

Species smallmouth bass Strain Water Temp. 70 F

Lot Number Age of Fish 1 year No. Pools Sampled

Sample Size No. Fish/Lot Investigators Emily & Sue

Remarks accidently lost blood for Storet # 605002

fish 1-20, fish 11-20 were wrapped and frozen.

Fish 31-35 were fixed in bovins and also blood was collected for Hmt and SPrt

Fish		TL	Wgt	Condition of Fins									Physical Observations											Blood		
No.	Sex	mm	gm	CF	SD	FD	LF	RF	LPf	RPf	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GIBl	Kidn	Hgut	Hmt	Leu	SPrt
1.0	U	108	15.8	1.3	0	0F	0	0F	0	0	0	0F	N	N	N	N	N	N	0.0	N	FD	2	N	N		-	
2.0	U	105	16.2	1.4	0	0	0F	0F	0	0	0	0F	N	N	N	N	N	N	0.0	N	N	2	N	N		-	
3.0	U	127	24.6	1.2	0	0	0	0	0	0	0F	0	N	N	N	N	N	N	1.0	N	FD	2	N	N		-	
4.0	U	145	39.4	1.3	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	N	3.0	N	FD	2	N	N		-	
5.0	U	109	13.8	1.1	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	N	0.0	N	N	2	N	N		-	
6.0	U	137	34.6	1.3	0	0F	0F	0F	0	0	0F	0F	N	N	N	N	N	N	1.0	N	FD	2	N	N		-	
7.0	U	109	16.1	1.2	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	N	0.0	N	N	1	N	N		-	
8.0	U	107	16.7	1.4	0	0	0	0	0	0F	0F	0F	N	N	N	N	N	N	1.0	N	N	2	N	N		-	
9.0	U	121	25.9	1.5	0	0F	0	0F	0	0	0F	0F	N	N	N	N	N	N	1.0	N	PS	2	N	N		-	
10.0	U	114	22.4	1.5	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	N	1.0	N	N	2	N	N		-	
11.0	U	125	24.8	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-			
12.0	U	124	24.2	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
13.0	U	115	19.8	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
14.0	U	128	26.4	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
15.0	U	159	59.7	1.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
16.0	U	128	25.8	1.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
17.0	U	129	27.8	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
18.0	U	133	33.0	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
19.0	U	120	24.7	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
20.0	U	117	21.1	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	
21.0	U	137	35.1	1.4	0	0	0	0	0	0	0F	0	N	N	N	N	N	N	1.0	N	N	2	N	N	54.0	-	7.0
22.0	U	138	38.8	1.5	0	0	0	0	0	0	0	0	N	N	N	N	N	N	2.0	N	N	2	N	N	62.0	-	8.2
23.0	U	118	21.1	1.3	0	0F	0	0	0	0	0	0F	N	N	N	N	N	N	1.0	N	N	2	N	N	65.0	-	8.0
24.0	U	121	23.8	1.3	0	0F	0F	0	0	0	0	0F	N	N	N	N	N	N	1.0	N	PS	2	N	N	67.0	-	9.0
25.0	U	120	24.9	1.4	0	0F	0	0	0F	0	0	0	N	N	N	N	N	N	1.0	N	FD	2	N	N	55.0	-	6.0
26.0	U	131	31.0	1.4	0	0F	0	0F	0	0	0F	0F	N	N	PS	N	N	N	2.0	N	N	2	N	N	54.0	-	6.0
27.0	U	115	20.6	1.4	0	0F	0	0F	0	0	0F	0F	N	N	N	N	N	N	1.0	N	PS	2	N	N	60.0	-	8.0
28.0	U	126	28.6	1.4	0	0	0	0	0	0	0	0F	N	N	N	N	N	N	2.0	N	N	2	N	N	66.0	-	7.0
29.0	U	123	24.3	1.3	0	0	0F	0	0	0	0	0F	N	N	N	N	N	N	1.0	N	PS	2	S	N	67.0	-	7.0
30.0	U	115	20.8	1.4	0	0F	0	0F	0	0	0	0F	N	N	N	N	N	N	0.0	N	PS	2	N	N	56.0	-	5.5
ave		123.5	26.1	1.3															1.0						60.6		7.2
count		30.0	30.0	30.0															20.0						10.0		10.0
min		105.0	13.8	1.1															0.0						54.0		5.5
max		159.0	59.7	1.5															3.0						67.0		9.0
std		12.1	9.1	0.1															0.8						5.5		1.1
cv		9.8	35.1	7.2															79.5						9.1		15.7

FISH HEALTH ASSESSMENT - SUMMARY DATA

General Information

Date of Assessment 07/17/92 **Assessment Number** 92120
Location Sheboygan River, downstream of Kohler Dam **Storet Number** 605002
Species Smallmouth Bass, clipped and relocated **Sample Size** 28
Collection Method stream shocker **Water Temperature**

Vital Statistics

	mean	range	sd	cv	n
Length					
Total	147 mm	130 - 165	11	8	28
Fork					
Weight	42.0 gm	27.8 - 58.4	9.8	23.2	28
Condition Index	1.3	1.1 - 1.4	0.1	5.9	28
Age	approx. 1 year plus 1 month			100% distribution by age	
Sex	7% Unknown, 29 % males, 64% females				

Fin Condition

Fin Erosion Condition Index = 0.2

Non-caudal	0	0% Fish Affected
Caudal	1.2	0% Fish Affected

Percent of Fin Indices					**Percent of Fish Pathology**			
	Erosion 0	**1**	**2**	**3**	**F**	**H**	**Ps**	**L**
Dorsal	100	0	0	0	39	0	0	0
Spiny	100	0	0	0	3.6	0	0	0
Fleshy	100	0	0	0	36	0	0	0
Left Pectoral	100	0	0	0	14	0	0	0
Right Pectoral	100	0	0	0	0	0	0	0
Left Pelvic	100	0	0	0	29	0	0	0
Right Pelvic	clipped							
Upper Caudal	100	0	0	0	71	0	0	0
Lower Caudal	93	7	0	0	75	0	0	0

Anatomical Parameters

Intestinal Body Fat mean = 1.9 range = 1.0 - 3.0 sd = 0.8 cv = 40.7 n = 28

Percent Distribution of Fish Pathology

Eyes	N:100	B1: B2:	E1: E2:	H1: H2:	M1: M2:	C1: C2:	Ps1: Ps2:	
Operculums	N:100	A1: A2:						
Gills	N:100	E:	F:	C:	M:	P:	Ps:	
Pseudobranchs	N:100	1:	2:	3:	4:			
Thymus	N:100	1:	2:					
Body Cavity	N:54	1:	2:	3:	4:46			
Mesenteric Fat	0:0	1:36	2:43	3:21	4:			
Spleen	Nr:100	Nb:	G:	E:	P:	Ps:0	Nd:	
Liver	N:89	P:0	F:	Nd:	Fd:	Sd:	Ps:11	
Gall Bladder	0:0	1:0	2:100	3:100	4:0			
Kidney	N:100	S:0	M:	G:	U:	P:	Ps:	P: Pl:
Hind Gut	N:100	1:	2:					

Blood Characteristics

		mean	range	sd	cv	n
Hematocrit		45.5	39.5 - 52.0	3.1	6.8	25
Leucocrit	0.1	0 - 0.5	0.1	142.8	25	
Serum Protein		6.1	4.8 - 7.6	0.7	12.1	23

Comments

These 28 were also analyzed for contaminant,. and 2 other fish were perserved for histopath

FISH HEALTH ASSESSMENT
NECROPSY DATA

DATE 7/17/92

Quality Control Assessment No. 92120
Species Illmouth Bass (relocated, clipped)
Lot Number
Sample Size
Remarksh 26 & 27 fixed for histology
Fish 1 to 25 and 28 to 30 frozen for contaminant analysis

Strain
Age of Fish
No. Fish/Lot
Storet # 605002

Station w Kohler Dam, Sheboygan R.
Water Temp. 70
No. Pools Sampled
Investigators Nelson, O'Mally, arcquenski Schrank, et al.

Fish No.	Sex	TL mm	Wt gm	Condition of Fins								Physical Observations												Blood		
				CF	SD	FD	LP	RP	LPl	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Heat	Hmt	Leu	SPrt
1	F	154	49.8	1.4	0	0	0	0	0	0F	0F	N	N	N	N	N	N	2.0	N	N	2/4	N	N	47.9	0.1	5.3
2	F	142	39.5	1.4	0	0	0	0	0F	0F	1F	N	N	N	N	N	N	1.0	N	N	2/4	N	N	44.0	0.1	5.5
3	F	160	53.0	1.3	0	0	0	0	0	0F	0F	N	N	N	N	N	4	1.0	N	N	2/4	N	N	47.5	0.0	6.4
4	UN	147	36.3	1.1	0	0	0	0	0F	0F	0	N	N	N	N	N	4	1.0	N	N	2/4	N	N	47.0	0.0	4.8
5	F	135	31.1	1.3	0	0F	0	0	0	0F	0F	N	N	N	N	N	N	2.0	N	N	2/4	N	N	50.0	0.0	6.3
6	F	155	48.0	1.3	0	0	0F	0	0	0	0F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	40.5	0.0	5.2
7	F	159	53.8	1.3	0	0F	0	0	0F	0	0F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	42.5	0.5	5.8
8	F	133	28.1	1.2	0	0	0	0	0	0F	0F	N	N	N	N	N	N	1.0	N	N	2/4	N	N	41.0	0.0	5.5
9	UN	132	31.5	1.4	0	0	0	0	0	0F	0F	N	N	N	N	N	4	1.0	N	N	2/4	N	N	46.0	0.5	
10	F	163	54.4	1.3	0F	0	0F	0	0F	0	0	N	N	N	N	N	4	2.0	N	N	2/4	N	N	48.8	0.1	
11dead	*M	163	58.4	1.3	0	0F	0	0	0F	0F	0F	N	N	N	N	N	N	3.0	N	PS	2/4	N	N			
12	F	152	44.9	1.3	0	0	0	0	0	0F	0	N	N	N	N	N	4	2.0	N	N	2/4	N	N	43.0	0.4	6.0
13	F	142	39.3	1.4	0	0F	0	0	0	0	0	N	N	N	N	N	4	2.0	N	N	2/4	N	N	47.0	0.1	6.0
14	F	132	27.8	1.2	0	0	0	0	0F	0F	0	N	N	N	N	N	4	1.0	N	N	2/4	N	N	46.8	0.1	5.2
15	F	130	28.1	1.3	0	0F	0	0	0	0F	0	N	N	N	N	N	N	3.0	N	N	2/4	N	N	47.0	0.2	5.1
16	M	162	56.1	1.3	0	0	0	0	0	0F	0F	N	N	N	N	N	N	2.0	N	N	2/4	N	N	44.5	0.0	7.1
17	F	160	49.1	1.2	0	0F	0	0	0	0	1F	N	N	N	N	N	N	2.0	N	N	2/4	N	N	44.0	0.0	5.8
18	M	158	55.3	1.4	0	0	0	0	0	0F	0F	N	N	N	N	N	4	2.0	N	PS	2/4	N	N	44.0	0.1	6.5
19dead	M	143	37.4	1.3	0	0F	0	0	0	0F	0F	N	N	N	N	N	N	1.0	N	N	2/4	N	N			
20	M	140	34.1	1.2	0	0	0	0	0	0	0F	N	N	N	N	N	4	3.0	N	N	2/4	N	N	52.0	0.0	6.6
21	F	141	37.8	1.3	0	0F	0	0	0	0	0F	N	N	N	N	N	N	3.0	N	N	2/4	N	N	39.5	0.1	6.5
22	F	149	40.1	1.2	0	0F	0	0	0	0F	0	N	N	N	N	N	N	2.0	N	N	2/4	N	N	46.1	0.1	5.8
23	F	147	38.8	1.2	0	0	0F	0	0F	0F	0F	N	N	N	N	N	N	3.0	N	N	2/4	N	N	48.0	0.0	7.6
24	F	165	57.2	1.3	0	0	0	0	0	0F	0F	N	N	N	N	N	4	3.0	N	N	2/4	N	N	43.5	0.1	7.4
25dead	M	136	33.8	1.3	0	0F	0F	0	0	0F	0F	N	N	N	N	N	N	1.0	N	N	2/4	N	N			
26	-				-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-			
27	-				-	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-			
28	F	145	39.9	1.3	0	0	0	0	0	0F	0F	N	N	N	N	N	N	1.0	N	N	2/4	N	N	45.8	0.0	6.5
29	M	150	38.6	1.1	0	0	0	0	0F	0F	0F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	41.8	0.1	6.3
30	M	133	33.9	1.4	0	0	0	0	0	0	0F	N	N	N	N	N	N	1.0	N	PS	2/4	N	N	48.5	0.0	6.4
* took gonad			Note: 19 PS is possible																							
ave		147	42.0	1.3														1.9						45.5	0.1	6.1
count		28	28.0	28.0														28.0						25.0	25.0	23.0
min		130	27.8	1.1														1.0						39.5	0.0	4.8
max		165	58.4	1.4														3.0						52.0	0.5	7.6
std		11	9.8	0.1														0.8						3.1	0.1	0.7
cv		8	23.2	5.9														40.7						6.8	142.8	12.1

FISH HEALTH ASSESSMENT - SUMMARY DATA

General Information

Date of Assessment 07/17/92 **Assessment Number** 92121
Location Sheboygan River, downstream of Kohler Dam **Storet Number** 605002
Species Smallmouth Bass, resident **Sample Size** 30
Collection Method stream shocker **Water Temperature**

Vital Statistics

	mean	range	sd	cv	n
Length					
Total	134 mm	117 - 168	13	9	30
Fork					
Weight	33.4 gm	19.8 - 64.6	11.1	33.1	30
Condition Index	1.4	1.2 - 2.2	0.2	13.6	30

Age approx. 1 year plus 1 month 100% distribution by age
Sex 0% Unknown, 17 % males, 89% females

Fin Condition

Fin Erosion Condition Index = 0

Non-caudal	0	0% Fish Affected
Caudal	0	0% Fish Affected

Percent of Fin Indices					**Percent of Fish Pathology**			
	Erosion 0	**1**	**2**	**3**	**F**	**H**	**Ps**	**L**
Dorsal	100	0	0	0	7	0	0	0
Spiny	100	0	0	0	33	0	0	0
Fleshy	100	0	0	0	40	0	0	0
Left Pectoral	100	0	0	0	37	0	0	0
Right Pectoral	100	0	0	0	13	0	3	0
Left Pelvic	100	0	0	0	27	0	0	0
Right Pelvic	100	0	0	0	23	0	0	0
Upper Caudal	100	0	0	0	83	0	0	0
Lower Caudal	100	0	0	0	89	0	0	0

Anatomical Parameters

Intestinal Body Fat mean = 1.8 range = 1.0 - 3.0 **sd** = 0.7 **cv** = 41.2 n = 30

Percent Distribution of Fish Pathology

Eyes	**N:**100	**B1:** **B2:**	**E1:** **E2:**	**H1:** **H2:**	**M1:** **M2:**	**C1:** **C2:**	**Ps1:** **Ps2:**	
Operculums	**N:**100	**A1:** **A2:**						
Gills	**N:**70	**E:**	**F:**	**C:**	**M:**	**P:**30	**Ps:**	
Pseudobranchs	**N:**100	**1:**	**2:**	**3:**	**4:**			
Thymus	**N:**100	**1:**	**2:**					
Body Cavity	**N:**60	**1:**	**2:**	**3:**	**4:**40			
Mesenteric Fat	0:0	1:40	2:43	3:17	**4:**			
Spleen	**Nr:**57	**Nb:**	**G:**	**E:**	**P:**7	**Ps:**37	**Nd:**	
Liver	**N:**27	**P:**7	**F:**	**Nd:**	**Fd:**	**Sd:**	**Ps:**73	
Gall Bladder	**0:**0	**1:**10	**2:**90	**3:**0	**4:**83			
Kidney	**N:**100	**S:**0	**M:**	**G:**	**U:**	**P:**	**Ps:**	**P:** **Pl:**
Hind Gut	**N:**100	**1:**	**2:**					

Blood Characteristics

		mean	range	sd	cv	n
Hematocrit		45.4	40.0 - 58.5	4.6	10.1	18
Leucocrit	0.03	0 - 0.2	0.1	178.2	18	
Serum Protein		6.0	5.0 - 6.8	0.6	9.5	18

Comments

29 fish were also analyzed for contaminant,. and 2 other fish were perserved for histopath

low Resident

FISH HEALTH ASSESSMENT
NECROPSY DATA

DATE 07/17/92

Quality Control Assessment No. 92121

Species smallmouth bass, resident

Lot Number

Sample Size

Remarks9 were frozen for contamin. analysis

itaminant analysis. Fish 31 and 32 were fixed for histopathology

Strain

Age of Fish apprx 13 month onths

No. Fish/Lot

Storet # 605002

Station oygan R. below Kohler dam

Water Temp. 70 F (resident)

No. Pools Sampled

Investigators Emily & Sue

Fish		TL	Wgt	Condition of Fins									Physical Observations											Blood		
No.	Sex	mm	gm	CF	SD	FD	LP	RP	LPl	RPI	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Hmt	Leu	SPrt
1dead	F	123	25.5	1.4	0	0F	0	0	0	0	0F	0	N	N	P	N	N	N	1.0	PS	PS	2,4	N	N			
2dead	F	130	30.8	1.4	0	0	0F	0	0	0	0F	0F	N	N	P	N	N	4	3.0	P	PS	1	N	N			
3dead	M	130	30.7	1.4	0	0F	0F	0	0	0	0F	0F	N	N	P	N	N	4	1.0	N	PS	2,4	N	N			
4dead	F	125	26.5	1.4	0	0	0	0	0F	0	0F	0	N	N	P	N	N	4	1.0	PS	PS	2,4	N	N			
5dead	F	137	34.0	1.3	0	0	0	0F	0	0	0F	0F	N	N	P	N	N	4	1.0	N	PS	2,4	N	N			
6dead	F	118	20.3	1.2	0	0F	0F	0	0	0	0F	0F	N	N	P	N	N	4	1.0	N	PS	2,4	N	N			
7dead	F	133	28.6	1.2	0	0	0	0	0	0F	0F	0F	N	N	P	N	N	4	2.0	N	PS	2,4	N	N			
8dead	M	136	34.7	1.4	0	0F	0F	0F	0	0	0F	0F	N	N	P	N	N	4	2.0	PS	PS	2,4	N	N			
9	F	131	30.2	1.3	0	0	0	0	0F	0	0F	0F	N	N	N	N	N	4	2.0	N	P,PS	2,4	N	N	58.5	0.1	6.6
10	F	160	57.9	1.4	0	0	0	0	0F	0F	0F	0F	N	N	N	N	N	4	1.0	P	N	2,4	N	N	41.0	0.0	6.2
11dead	F	127	28.6	1.4	0F	0	0	0PS	0	0	0	0	N	N	P	N	N	N	2.0	N	PS	2	N	N			
12	F	163	57.3	1.3	0	0	0F	0	0	0	0F	0F	N	N	N	N	N	4	1.0	PS	PS	2	N	N	49.0	0.0	6.6
13	F	125	25.5	1.3	0	0F	0	0	0	0	0F	0	N	N	N	N	N	N	2.0	N	PS	2,4	N	N	48.5	0.1	5.2
14	F	132	50.5	2.2	0	0	0	0	0	0F	0F	0	N	N	N	N	N	N	1.0	PS	PS	2,4	N	N	43.5	0.0	5.7
15	M	117	20.2	1.3	0	0F	0F	0	0F	0	0F	0F	N	N	N	N	N	N	1.0	PS	P,PS	2,4	N	N	43.9	0.0	5.6
16	F	140	34.3	1.3	0	0	0	0F	0	0	0F	0F	N	N	N	N	N	4	2.0	N	PS	1	N	N	48.0	0.0	5.7
17	F	168	64.6	1.4	0	0	0F	0	0	0	0	0F	N	N	N	N	N	N	3.0	PS	PS	1	N	N	49.5	0.0	6.7
18	F	140	35.0	1.3	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	4	2.0	N	N	2,4	N	N	48.0	0.0	5.3
19	F	132	31.5	1.4	0	0F	0	0	0	0	0F	0F	N	N	N	N	N	N	2.0	PS	PS	2,4	N	N	41.5	0.2	5.8
20	F	126	26.2	1.3	F	0	0	0	0F	0	0F	0F	N	N	N	N	N	N	2.0	N	PS	2,4	N	N	46.5	0.0	6.2
21	F	140	33.9	1.2	0	F	F	0	0	F	F	F	N	N	N	N	N	N	3.0	N	N	2,4	N	N	40.0	0.1	5.0
22	F	140	33.4	1.2	0	0	0	0	0	0	F	F	N	N	N	N	N	N	1.0	N	N	2,4	N	N	40.0	0.1	6.6
23	F	135	34.3	1.4	0	0	0	0	0	0	F	F	N	N	N	N	N	N	1.0	N	PS	2,4	N	N	41.0	0.0	6.4
24	F	144	36.4	1.2	0	0	0	0	F	F	0	F	N	N	N	N	N	N	3.0	PS	PS	2,4	N	N	42.0	0.0	6.0
25	M	142	39.7	1.4	0	0	F	0	F	F	0	F	N	N	N	N	N	N	3.0	N	N	2,4	N	N	45.5	0.0	6.8
26	F	118	19.8	1.2	0	0	0	F	F	0	F	F	N	N	N	N	N	N	2.0	N	N	2,4	N	N	46.0	0.0	5.9
27	F	117	21.7	1.4	0	0	F	0	0	0	F	F	N	N	N	N	N	N	2.0	PS	PS	2,4	N	N	44.5	0.0	5.3
28dead	F	130	26.3	1.2	0	0	0	0	0	F	F	F	N	N	N	N	N	N	2.0	N	N	2,4	N	N			
29dead	M	130	27.4	1.2	0	0	F	0	0	0	0	F	N	N	N	N	N	N	1.0	PS	N	2,4	N	N			
30dead	F	130	35.9	1.6	0	F	0	0	0	0	F	F	N	N	N	N	N	N	2.0	N	PS	2,4	N	N			
ave		134	33.4	1.4															1.8						45.4	0.03	6.0
count		30	30.0	30.0															30.0						18.0	18.00	18.0
min		117	19.8	1.2															1.0						40.0	0.00	5.0
max		168	64.6	2.2															3.0						58.5	0.20	6.8
std		13	11.1	0.2															0.7						4.6	0.1	0.6
cv		9	33.1	13.6															41.2						10.1	178.2	9.5

FISH HEALTH ASSESSMENT - SUMMARY DATA

General Information

Date of Assessment 07/17/92 **Assessment Number** 92122
Location Sheboygan River, downstream of Kohler Dam **Storet Number** 605002
Species Golden Redhorse **Sample Size** 7
Collection Method stream shocker **Water Temperature**

Vital Statistics

	mean	range	sd	cv	n
Length					
Total	410 mm	380 - 450	23	6	7
Fork					
Weight	786 gm	590 - 986	122	15	7
Condition Index	1.1	1.1 - 1.2	0.1	4.9	7
Age	age	**% distribution by age**			
Sex	13% Unknown, 43 % males, 43% females				

Fin Condition

Fin Erosion Condition Index = 0.8

Non-caudal	0	0% Fish Affected
Caudal	2.4	0% Fish Affected

Percent of Fin Indices					**Percent of Fish Pathology**			
	Erosion 0	**1**	**2**	**3**	**F**	**H**	**Ps**	**L**
Dorsal								
Spiny								
Fleshy								
Left Pectoral	100	0	0	0	14	29	0	29
Right Pectoral	100	0	0	0	0	14	3	14
Left Pelvic	100	0	0	0	0	14	0	14
Right Pelvic	100	0	0	0	0	0	0	0
Upper Caudal	100	0	0	0	71	14	0	14
Lower Caudal	86	4	0	0	71	0	0	0

Anatomical Parameters

Intestinal Body Fat mean = 2.4 range = 2.0 - 3.0 sd = 0.5 cv = 22.0 n = 7

Percent Distribution of Fish Pathology

Eyes	N:100	B1: B2:	E1: E2:	H1: H2:	M1: M2:	C1: C2:	Ps1: Ps2:	
Operculums	N:100	A1: A2:						
Gills	N:100	E:	F:	C:	M:	P:	Ps:	
Pseudobranchs	N:100	1:	2:	3:	4:			
Thymus	N:100	1:	2:					
Body Cavity	N: 14	1:	2:	3:	4:86			
Mesenteric Fat	0:0	1:0	2:57	3:43	4:			
Spleen	Nr:85	Nb:	G:	E:	P:14	Ps:	Nd:	
Liver	N:71	P:14	F:	Nd:	Fd:14	Sd:	Ps:	
Gall Bladder	0:0	1:14	2:86	3:0	4:86			
Kidney	N:57	S:14	M:	G:	U:	PL:29	Ps:	P: Pl:
Hind Gut	N:100	1:	2:					

Blood Characteristics

		mean	range	sd	cv	n
Hematocrit		39.9	31.5 - 47.1	6.6	16.6	7
Leucocrit	1.1	0.5 - 2.0	0.4	42.0	7	
Serum Protein		3.7	2.9 - 4.1	0.5	13.5	5

Comments

3 fish were also analyzed for contaminant,. and #5's liver was fixed for histopathology

FISH HEALTH ASSESSMENT

NECROPSY DATA

DATE 07/17/92

Quality Control Assessment No. 92122

Species Golden redhorse

Lot Number

Sample Size

Remarks Thymus - unsure location;
no pyloric ceaca, therefore fat over intestine

Strain

Age of Fish

No. Fish/Lot

Storet # 605002

Station oygan R. below Kohler dam

Water Temp. 70 F

No. Pools Sampled

Investigators Emily & Sue

Fish No.	Sex	TL mm	Wgt gm	Condition of Fins							Physical Observations												Blood		
				CF	LP	RP	LPl	RPl	UC	LC	Eyes	Oper	Gills	Psbr	Thy	BdCv	Fat	Spln	Livr	GlBl	Kidn	Hgut	Hmt	Leu	SPrt
1	M	408	818	1.2	H/L	0	0	0	0/F	0/F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	33.5	1.0	4.1
2*	M	380	590	1.1	H/L/F	0	0	0	0	0	N	N	N	N	N	4	2.0	N	N	2/4	N	N	47.1	1.0	4.0
3#	U	415	814	1.1	0	0	0	0	0	1	N	N	N	N	N	4	3.0	P	P	1	S	N	46.5	0.5	3.5
4**	F	450	986	1.1	0	0	0	0	HLF	0F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	34.2	1.0	4.1
5***	F	417	808	1.1	0	0LH3	0	0	0/F	0/F	N	N	N	N	N	N	3.0	N	FD	2/4	PL	N	42.5	1.0	
6	M	412	792	1.1	0	0	0	0	0/F	0/F	N	N	N	N	N	4	3.0	N	N	2/4	PL	N	44.0	1.0	
7***	F	385	696	1.2	0	0	HL/1	0	0/F	0/F	N	N	N	N	N	4	2.0	N	N	2/4	N	N	31.5	2.0	2.9
ave		410	786	1.1													2.4						39.9	1.1	3.7
count		7	7	7.0													7.0						7.0	7.0	5.0
min		380	590	1.1													2.0						31.5	0.5	2.9
max		450	986	1.2													3.0						47.1	2.0	4.1
std		23	122	0.1													0.5						6.6	0.4	0.5
cv		6	15	4.9													22.0						16.6	42.0	13.5

* hemorrage above RP & RPL

hemmorrage in the anal fin

**hemorrage on body above pelvic fin

*** severe lesion on caudel peduncle

Location	Site Name	T/R/S	Collection Date	Sample Details	Species	Form	Gender	Number/Sample	Length (in)	Weight (gm)	Parameter	Result	Units	QA Index
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 1-5	*SMALLMOUTH BASS *	WHOLE FISH	U	5	4.91		0.03 FAT PERCENT NON-HEX EXT	4	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 1-5	*SMALLMOUTH BASS *	WHOLE FISH	U	5	4.91		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 6-10	*SMALLMOUTH BASS *	WHOLE FISH	U	5	5.21		0.03 FAT PERCENT NON-HEX EXT	4.4	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 6-10	*SMALLMOUTH BASS *	WHOLE FISH	U	5	5.21		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 11-15	*SMALLMOUTH BASS *	WHOLE FISH	U	5	4.8		0.03 FAT PERCENT NON-HEX EXT	4.1	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 11-15	*SMALLMOUTH BASS *	WHOLE FISH	U	5	4.8		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 16-20	*SMALLMOUTH BASS *	WHOLE FISH	U	5	5.06		0.03 FAT PERCENT NON-HEX EXT	4.1	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	# 16-20	*SMALLMOUTH BASS *	WHOLE FISH	U	5	5.06		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	24-28	SMALLMOUTH BASS	WHOLE FISH	U	5	4.33		0.02 FAT PERCENT NON-HEX EXT	4.1	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	24-28	SMALLMOUTH BASS	WHOLE FISH	U	5	4.33		0.02 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	29-33	SMALLMOUTH BASS	WHOLE FISH	U	5	4.61		0.02 FAT PERCENT NON-HEX EXT	4.7	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	29-33	SMALLMOUTH BASS	WHOLE FISH	U	5	4.61		0.02 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	39-38	SMALLMOUTH BASS	WHOLE FISH	U	5	4.96		0 FAT PERCENT NON-HEX EXT	4.1	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	39-38	SMALLMOUTH BASS	WHOLE FISH	U	5	4.96		0 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	39-93	SMALLMOUTH BASS	WHOLE FISH	U	5	4.88		0.03 FAT PERCENT NON-HEX EXT	4.3	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	39-93	SMALLMOUTH BASS	WHOLE FISH	U	5	4.88		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	44-48	SMALLMOUTH BASS	WHOLE FISH	U	5	5.08		0.03 FAT PERCENT NON-HEX EXT	3.9	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	44-48	SMALLMOUTH BASS	WHOLE FISH	U	5	5.08		0.03 PCB TOTAL	0.2	UG/G	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	49-53	SMALLMOUTH BASS	WHOLE FISH	U	5	5.55		0.04 FAT PERCENT NON-HEX EXT	3.8	%	1
605037	SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS	15 22E 27	06/19/1992	49-53	SMALLMOUTH BASS	WHOLE FISH	U	5	5.55		0.04 PCB TOTAL	0.2	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 26-30	SMALLMOUTH BASS	WHOLE FISH	U	5	4.8		0.03 FAT PERCENT NON-HEX EXT	3.3	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 26-30	SMALLMOUTH BASS	WHOLE FISH	U	5	4.8		0.03 PCB TOTAL	11	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 11-14	SMALLMOUTH BASS	WHOLE FISH	U	4	4.84		0.02 FAT PERCENT NON-HEX EXT	2.3	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 11-14	SMALLMOUTH BASS	WHOLE FISH	U	4	4.84		0.02 PCB TOTAL	8.7	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 15	SMALLMOUTH BASS	WHOLE FISH	U	1	6.26		0.06 FAT PERCENT NON-HEX EXT	5.5	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 15	SMALLMOUTH BASS	WHOLE FISH	U	1	6.26		0.06 PCB TOTAL	15	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 16-20	SMALLMOUTH BASS	WHOLE FISH	U	5	4.94		0.03 FAT PERCENT NON-HEX EXT	4.1	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/16/1992	# 16-20	SMALLMOUTH BASS	WHOLE FISH	U	5	4.94		0.03 PCB TOTAL	12	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 1-5	SMALLMOUTH BASS	WHOLE FISH	U	5	4.63		0.02 FAT PERCENT NON-HEX EXT	4.1	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 1-5	SMALLMOUTH BASS	WHOLE FISH	U	5	4.63		0.02 PCB TOTAL	13	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 6-10	SMALLMOUTH BASS	WHOLE FISH	U	5	4.68		0.02 FAT PERCENT NON-HEX EXT	3.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 6-10	SMALLMOUTH BASS	WHOLE FISH	U	5	4.68		0.02 PCB TOTAL	13	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 21-25	SMALLMOUTH BASS	WHOLE FISH	U	5	4.99		0.03 FAT PERCENT NON-HEX EXT	3.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		06/19/1992	# 21-25	SMALLMOUTH BASS	WHOLE FISH	U	5	4.99		0.03 PCB TOTAL	11	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #1 2 3	*SMALLMOUTH BASS *	WHOLE FISH	B	3	5		0.03 FAT PERCENT NON-HEX EXT	3.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #1 2 3	*SMALLMOUTH BASS *	WHOLE FISH	B	3	5		0.03 PCB TOTAL	15	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #4 5 6	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.99		0.03 FAT PERCENT NON-HEX EXT	4.1	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #4 5 6	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.99		0.03 PCB TOTAL	19	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #7 8 9	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.25		0.03 FAT PERCENT NON-HEX EXT	4.5	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED #7 8 9	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.25		0.03 PCB TOTAL	21	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 10 11 12	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.91		0.05 FAT PERCENT NON-HEX EXT	9	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 10 11 12	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.91		0.05 PCB TOTAL	18	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 13 14 15	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.91		0.03 FAT PERCENT NON-HEX EXT	4.1	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 13 14 15	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.91		0.03 PCB TOTAL	20	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 16 17 18	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.88		0.04 FAT PERCENT NON-HEX EXT	3.9	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 16 17 18	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.88		0.04 PCB TOTAL	15	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 19 20 21	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.22		0.03 FAT PERCENT NON-HEX EXT	4.9	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 19 20 21	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.22		0.03 PCB TOTAL	22	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 22 23 24	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.5		0.04 FAT PERCENT NON-HEX EXT	4.5	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 22 23 24	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.5		0.04 PCB TOTAL	24	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 25 26 27	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.95		0.03 FAT PERCENT NON-HEX EXT	4.6	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 25 26 27	*SMALLMOUTH BASS *	WHOLE FISH	U	3	4.95		0.03 PCB TOTAL	19	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 28 30	*SMALLMOUTH BASS *	WHOLE FISH	U	2	5.3		0.03 FAT PERCENT NON-HEX EXT	4.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	UNCLIPPED 28 30	*SMALLMOUTH BASS *	WHOLE FISH	U	2	5.3		0.03 PCB TOTAL	18	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 1 2 3	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.98		0.05 FAT PERCENT NON-HEX EXT	3.7	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 1 2 3	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.98		0.05 PCB TOTAL	9.9	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 4 5 6	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.73		0.04 FAT PERCENT NON-HEX EXT	3.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 4 5 6	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.73		0.04 PCB TOTAL	10	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 7 8 9	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.56		0.04 FAT PERCENT NON-HEX EXT	3.3	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 7 8 9	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.56		0.04 PCB TOTAL	11	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 10 11 12	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.27		0.05 FAT PERCENT NON-HEX EXT	4.1	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 10 11 12	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.27		0.05 PCB TOTAL	11	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 13 14 15	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.3		0.03 FAT PERCENT NON-HEX EXT	3.8	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 13 14 15	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.3		0.03 PCB TOTAL	12	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 16 17 18	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.3		0.05 FAT PERCENT NON-HEX EXT	3.9	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 16 17 18	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.3		0.05 PCB TOTAL	10	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 19 20 21	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.56		0.04 FAT PERCENT NON-HEX EXT	3.9	%	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 19 20 21	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.56		0.04 PCB TOTAL	12	UG/G	1
605002	SHEBOYGAN RIVER BELOW KOHLER DAM		07/17/1992	LPL CLIPPED 22 23 24	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.05		0.05 FAT PERCENT NON-HEX EXT	4.5	%	1

605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 LPL CLIPPED 22 23 24	*SMALLMOUTH BASS *	WHOLE FISH	U	3	6.05	0.05 PCB TOTAL	12 UG/G	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 LPL CLIPPED 25 28 29	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.66	0.04 FAT PERCENT NON-HEX EXT	4.3 %	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 LPL CLIPPED 25 28 29	*SMALLMOUTH BASS *	WHOLE FISH	U	3	5.66	0.04 PCB TOTAL	13 UG/G	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 LPL CLIPPED 30	*SMALLMOUTH BASS *	WHOLE FISH	U	1	5.24	0.03 FAT PERCENT NON-HEX EXT	4.7 %	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 LPL CLIPPED 30	*SMALLMOUTH BASS *	WHOLE FISH	U	1	5.24	0.03 PCB TOTAL	14 UG/G	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 1	GREATER REDHORSE	WHOLE FISH	U	1	16.06	0.82 FAT PERCENT NON-HEX EXT	3.2 %	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 1	GREATER REDHORSE	WHOLE FISH	U	1	16.06	0.82 PCB TOTAL	32 UG/G	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 4	GREATER REDHORSE	WHOLE FISH	U	1	17.72	0.99 FAT PERCENT NON-HEX EXT	3.6 %	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 4	GREATER REDHORSE	WHOLE FISH	U	1	17.72	0.99 PCB TOTAL	33 UG/G	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 7	GREATER REDHORSE	WHOLE FISH	U	1	15.16	0.7 FAT PERCENT NON-HEX EXT	4 %	1
605002 SHEBOYGAN RIVER BELOW KOHLER DAM	07/17/1992 FISH # 7	GREATER REDHORSE	WHOLE FISH	U	1	15.16	0.7 PCB TOTAL	17 UG/G	1

Wentland, Thomas A

From: Amrhein, James F
Sent: Tuesday, August 29, 2000 1:16 PM
To: Wentland, Thomas A
Subject: Sheboygan River Records Request

Hi Tom,

I looked through my files and cannot find much related to the smallmouth bass cohort study. I have one memo from John Nelson saying how we should design a plan for such a study, but that's about it.

The study was pretty much a failure. We were successful in catching yearling SM bass from upstream of Sheboygan Falls, fin clipping them, and transplanting them downstream to the impacted area (between the Kohler dams). We were able to recapture some of fish after 1 month of exposure to the impacted area. However, we were unable to locate any transplanted fish after that.

We do know that the transplanted fish accumulated fairly substancial amounts of PCBs in their 1 month stay in the impacted area and I have raw data to that effect. Unfortunately, that seems to be all I have.

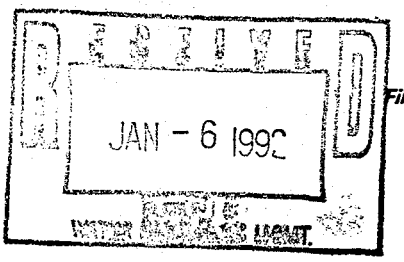
Perhaps John Nelson saved more notes on the study than I did.

Let me know if you want the raw data.

Jim

State of Wisconsin

CORRESPONDENCE/MEMORANDUM



Date: January 3, 1992 *File Ref:* 8130

To: Tom Aartila, SED
Jim Amrhein, WRM/2

From: John E. Nelson, Plymouth JN

Subject: Yearling Smallmouth Bass Sampling Plan For The Sheboygan River

In the very near future we need to finalize the study design and schedule for collecting smallmouth bass from the Sheboygan River in relation to the PCB cleanup effort. I am in the process for setting my survey schedule for the coming field season and will be writing comprehensive planning proposals for the 93-95 biennium over the next three weeks. The other issue is what funding is available to cover the expenses of this work during summer 1992 and spring 1993. We do not have project money available to cover LTE expenses in our Fisheries Management budget at this time.

I recommend that we use yearling smallmouth bass as our study subject since they will be most easily distinguished in the field for their age. They are also less susceptible to immigration and emigration than older age smallmouth and are readily available in large numbers. Sampling should be done in June to eliminate the chance of confusing them with fingerling.

I recommend we use two different sampling strategies. First we should collect samples of yearling above Sheboygan Falls near CTH "C" and from below the lower Kohler Dam. Secondly, Jim McNelly suggested and I agree that we collect up to 5,000 yearling from above the contaminant area, give them a distinguishable fin clip, stock them below the Kohler Dam and collect samples over the subsequent five months on a monthly basis. We need to agree on the sample sizes to give the results statistical validity.

This study should be very useful in the assessment of the PCB cleanup effort. Smallmouth bass probably have much different dietary characteristics than salmonids, leading to different rates of uptake. If we carefully design this study and analyze the data, we should be able to publish a very good quality paper on the results.

c: Randy Schumacher, Eagle
James McNelly, SED
Sharon Gayan, SED

Doug Beard

FISH / SEDIMENT CONTAMINANTS SYSTEM JOB ID: 971 08:26 Tuesday, September 5, 2000
FISH RESULTS BY SITE NAME - COLUMN STYLE
SMALLMOUTH BASS STUDY DATA

SITE=SHEBOYGAN RIVER ABOVE SHEBOYGAN FALLS LOCATION CODE=605037 COUNTY=SHEBOYGAN

FIELD NUMBER	T/R/S	COLLECTION DATE	SAMPLE TYPE	SAMPLE FORM	NUMBER OF FISH	AVERAGE LENGTH (IN.)	AVERAGE WEIGHT (KG.)	FAT	PCB
9201	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.91	0.03	4. - %	< 0.2 - UG/G
9202	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	5.21	0.03	4.4 - %	< 0.2 - UG/G
9203	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.80	0.03	4.1 - %	< 0.2 - UG/G
9204	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	5.06	0.03	4.1 - %	< 0.2 - UG/G
9205	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.33	0.02	4.1 - %	< 0.2 - UG/G
9206	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.61	0.02	4.7 - %	< 0.2 - UG/G
9207	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.96	0.00	4.1 - %	< 0.2 - UG/G
9208	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.88	0.03	4.3 - %	< 0.2 - UG/G
9209	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	5.08	0.03	3.9 - %	< 0.2 - UG/G
9210	15 22E 27	06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	5.55	0.04	3.8 - %	< 0.2 - UG/G

SITE=SHEBOYGAN RIVER BELOW KOHLER DAM LOCATION CODE=605002 COUNTY=SHEBOYGAN

FIELD NUMBER	T/R/S	COLLECTION DATE	SAMPLE TYPE	SAMPLE FORM	NUMBER OF FISH	AVERAGE LENGTH (IN.)	AVERAGE WEIGHT (KG.)	FAT	PCB
9201		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.00	0.03	3.8 - %	15. - UG/G
9202		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	4.99	0.03	4.1 - %	19. - UG/G
9203		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.25	0.03	4.5 - %	21. - UG/G
9204		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.91	0.05	9. - %	18. - UG/G
9205		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	4.91	0.03	4.1 - %	20. - UG/G
9206		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.88	0.04	3.9 - %	15. - UG/G
9207		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.22	0.03	4.9 - %	22. - UG/G
9208		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.50	0.04	4.5 - %	24. - UG/G
9209		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	4.95	0.03	4.6 - %	19. - UG/G
9210		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	2	5.30	0.03	4.8 - %	18. - UG/G
9211		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.98	0.05	3.7 - %	9.9 - UG/G
9212		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.73	0.04	3.8 - %	10. - UG/G
9213		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.56	0.04	3.3 - %	11. - UG/G
9214		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	6.27	0.05	4.1 - %	11. - UG/G
9215		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.30	0.03	3.8 - %	12. - UG/G
9216		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	6.30	0.05	3.9 - %	10. - UG/G
9217		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.56	0.04	3.9 - %	12. - UG/G
9218		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	6.05	0.05	4.5 - %	12. - UG/G
9219		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	3	5.66	0.04	4.3 - %	13. - UG/G
9220		07/17/1992	SMALLMOUTH BASS	WHOLE FISH	1	5.24	0.03	4.7 - %	14. - UG/G
9229		06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.63	0.02	4.1 - %	13. - UG/G
9230		06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.68	0.02	3.8 - %	13. - UG/G
9231		06/19/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.99	0.03	3.8 - %	11. - UG/G
9232		06/16/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.80	0.03	3.3 - %	11. - UG/G
9233		06/16/1992	SMALLMOUTH BASS	WHOLE FISH	4	4.84	0.02	2.3 - %	8.7 - UG/G
9234		06/16/1992	SMALLMOUTH BASS	WHOLE FISH	1	6.26	0.06	5.5 - %	15. - UG/G
9235		06/16/1992	SMALLMOUTH BASS	WHOLE FISH	5	4.94	0.03	4.1 - %	12. - UG/G

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