

1, 1 SPORY 1980

ese abile effects

3. H | r R PATRICK of the torethe evaluaid 1 bearral Waste

nati dos effectes.

iolo al Methods for Lao de Spec. Tech.

ns 1. transpolis, Ind.

8786.7

New York Fish and Game J. V 27, no. 1, 1980 p. 39-50

TOXICANTS IN SNAPPING TURTLES'

Ward B. Stone

Associate Wildlife Pathologist New York State Department of Environmental Conservation

Erik Kodat

Research Associate in Ecology Bard College

Stanley A. Buthas

Histology Technician New York State Department of Environmental Conservation

ABSTRACT

Selected tissues from 32 snapping turtles from New York waters were analyed to organochlorine contaminants. High levels of organochlorines, especially PCB's, were found in the fat (e.g., a mean of 2,990,60 ppm for the specimens from the Hudson River). Snapping turtles from the Hudson River and some other localities in the State seem unsaticable for human consumption because of contamination of their tissues with personant pollutions. It is suggested that the snapping turtle would make a useful addition to the species used for monitoring, and finding, cumulative toxicants.

The snapping turtle (Chelydra serpentina) is a common, large, omnivorous, aggressive, freshwater chelonian that has a wide distribution in the eastern United States (Carr. 1952; Ernst and Barbour, 1972). Since snapping turtles are relatively sedentary (Hammer, 1969) and long-lived, it was hypothesized that they would be an excellent species for monitoring pollutants in aquatic ecosystems. In addition, since their skeletal muscle, liver and eggs are used for human food (Rombauer and Becker, 1931; Seagears, 1949; Angier, 1970; Herity, 1978), it appeared important to examine selected tissues (especially from specimens from the heavily PCB-polluted Hudson River) for levels of organochlorine comminants.

MATERIALS AND METHODS

Thirty-two snapping turtles were captured from various waters in New York (23 from the Hudson River and nine from other localities) and submitted to the Wildlife Pathology Unit of the State Department of Environmental Conservation. The turtles were weighed and then killed by freezing or decapitation, after which the plastron was removed. Notes were made on the general condition of the carcass and the distribution of body fat. Samples of selected tissues (fat, liver, skeletal muscle and egg.) were placed in chemically clean containers, frozen and sent in that constrtion to Raltech Scientific Services, Int. at Madison (Wis.) or to the Department's Pollution Laboratory at Rome (N.Y.) where the levels of several organochlorine compounds were determined by gas chromatography (U.S. Food and Drug Administration, 1968; Heath and 15th, 1974), and cad

The authors acknowledge the assistance of the James Powers in statistical analysis and David Seymour in obtaining nucles from the Hudson River.

minos and mercury concentrations by atomic absorptis trophotometry. The analyses of fat samples were made on a fat other data represent wet weight.

In addition to the tissues themselves, turtle soup was made specimens. One was a turtle taken July 20, 1978 from the Hudse mile below Ford Edward, and the other was one taken July 31, ' Where Creek in Washington County, Both had high concent 1933 in their fat. Liver and skeleral muscle were used primaril the cortle from White Creek a special effort was made to dissmuch of the fat as possible from the muscle tissue. The seprepared according to the recipe of Seageans (1949).

Because of the relatively small samples and apparent diffe variability for the several tissues examined, F tests were first perfe appropriate comparisons, and then the t test (Steele and Torrie 81) was used to compare differences between the resultant mean

specasis: all

HIII LWO Piver 8 :- Irom ions of and for that as S WOTE

nces in ned for 960, p. alues.

le levels

4 the 17

1 > 0.3

Jutario

iollows:

I: hep-

RESULTS

The tissues examined comprised fat samples from 20 turn samples from 31 specimens, skeletal muscle samples from 29 s. and eggs from six specimens. The levels of polychlorinated 1 (PCIUs), the DDT metabolite DDE, and the insecticide Dieldric "tissues are summarized in Tables 1 to 4. All samples? had detectaof PCB's, the highest being in the far of turtles from the Hudern River 2,990.60 ppm), while concentrations in the lat of nine s from other localities averaged 464.16 ppm. Ten (58.8 per cent) fat samples that were tested for Dieldrin had high concentration ppno), and five (31.2 per cent) of the 16 tested for DDE had concernations greater than 5 ppm. A male tuttle from frondequoit Bay on Lakthat weighed 16.4 kilograms had residue levels (ppm) in its fat a PUB ., 666.0; DDE, 81.3; Dicklin, 34.1; hexachlorobenzene, 0 tachlor epoxide, 19.7; and Mircx, 19.7.

Concentrations of PCB's in 22 liver samples from turtles from son River averaged 66.05 ppm, and eight livers from turtles from other waters had a mean of 7.77 ppm. Concentrations of DDE and Diele in were generally low in the livers, but there were occasional exceptions (- thle 2). The liver of the male turtle from Irondequoit Bay already mentioned had residue levels (ppm) as follows: PCB's, 27.8; DDE, 3.58; Dieldo v. 0.99; hexas blorobenzene, 0.24; heptachlor epoxide, 0.85; Mirex, 0-1; and mercury, 2,72.

In contrast, skeletal muscle from 22 samples from turtles from the Hudson Civer averaged 4.24 ppm for PCB's with five of them (22.7 or cent)

71 he amples examined totalled 83 because the tissues (except eggs) for two turns that on River were pooled,

Locality

North Bay (near Tivoli)

North Bay (near Tivoli)

North Bay (near Tivoli)

Piermont Marsh

Mean

11.

Constitution Island Marsh

Vanderburgh Cove thear Staatsburg-

Vanderburgh Cove thear Staatsburgs

Suckies Cove thear Staatsburg

Otselic River (near Cincinnatus)

White Creek (Washington Co.)

frondequoir Bay of all comes.

Black Pond (near Ellisburg, Jefferson Co.)

Black Pond (near Ellisburg, Jefferson Co.)

Black Creek March (near Guilderland, Albany Co.)

Black Creek Marsh thea: Gundertand Albany Co. (

*Para in persons far have the light of each substance tested for but not detectable 5 l'issue samples from this speciment (soiled with those from preceding speciment

St. Lawrence River (near Morristown)

Spring Lakes (Dutchess Co.)

North Bay thear Hudson!

8 miles below Fort Edward

8 miles below Fort Edward

TABLE 1. TOXICAN IS IN SAMPLES OF FAIT TISSUE FROM SNAPPING TURTLES FROM VARIOUS LOCALITIES IN NEW YORK

Date

lune 14, 1976

lune 14, 1976

May 19, 1977

May 26, 1977

June 13, 1977

June 13, 1977

June 15, 1977

June 21, 1977

June 22, 1977

July 20, 1978

July 20, 1978

May 2, 1977

June 23, 1977

June 12, 1978

June 12, 1978

lune 12, 1978

July 31, 1978

September 13, 1978.

September 13, 1978

Contember 20 1975

Hudson River

Other waters

Sex

Female

Male

Male

Male.

Male

Male

Male

Maie

Male

Male

Female

Female

Female

Female

Female

Male

Male

Male

Make

Female

ö

PCB's

306

4,319

1.698

7.990

5.412

1.123

7.258

333

642

2,990.60

99.9

44.4

335

410

310

666

30.8

404 6

0.36

2.281

628

Gross weight

(kilograms)

4.2

2.0

4.6

1.5

10.2

15.4

13.6

8.5

4.5

9.1

2.7

6.51

2.3

2.9

2.9

2.7

2.4

3.4

9.1

8.2

16 4

5, 56

Toxicant*

DDE

< 5.00

§ 57.50

n.d.

n.d.

n.d.

n.d.

15.30

<11.11

0.14

1.4

3.40

8.40

8.80

n.d.

0.06

 0.02°

81.30 1

T: 30.

Dieldrin

< 0.20

6.80

1.50

0.50

26.50

12.80

17 00

0.33

< 8.45

n.d.

n.d.

1.60

2.40

n.d.

n.d.

n.d

34 10

1::

0.06

NICANTS IN SMAPPING TURILLES Stane et al.

of the second

TABLE 2. TOXICANIS IN SAMPLES

. (4171.1	Thur	FROM S	CAPPING	Ţ١	RILES	FROM	VARIOUS	s١	JOCALI	TIFS IS	New	YORK

	•	• 1			Toxicani*		
Locality	Date	Sex	(kilograms)	PCB:	DDF	Dieian	
	Hudson Rive	F	· · · · · · · · · · · · · · · · · · ·				
North Bay (near Tivoli)	June 14, 1976	, Female	4.2	(0.60	11.115	1 - 617	
North Bay (near Tivoli)	1 June 14, 1976	Male	2.0	9	9	ġ	
Constitution Island Marsh	June 15, 1976	Female	3.8	6.95	0.91	n.d.	
Constitution Island Marsh	June 15, 1976	Female	4.6	11.50	< 0.05	0.026	
Constitution Island Marsh	May 19, 1977	Male	8.6	45.80	0.63	0.16	
Constitution Island Marsh	May 19, 1977	Male	1:0	9.42	!		
Piermont Marsh	May 26, 1977	Male	1.5	1.79	0.09	1	
Piermont Marsh	May 26, 1977	Female	3.8	3.13	0.05	0.017	
North Bay (near Tivoli)	June 13, 1977	Male	10.2	0.54	n.d.	0.038	
Vanderburgh Cove (near Staatsburg)	June 13, 1927	Maie	15.4	103.00			
North Bay (near Tivoli)	June 14, 1877	Female	3.9	21.32	0.33		
Kingston Point	June 15, 1977	Female	9.1	107.00	1		
Kingston Point	June 15, 1977	Female	5.4	73 90	١	1	
Vanderburgh Cove (near Staatsburg)	June 15, 1977	Male	13.6	174.00		•	
Iona Island Marsh	June 20, 1977	Male	5.3	91.71	2.11	1	
Iona Island Marsh	June 20, 1977	Male	0.4	4.65	0.01		
lona Island Marsh	j June 20, 1977	Male	2.2	1.79	0.04	i	
Iona Island Marsh	June 20, 1977	Male	0.9	2.00	0.01	1	
Suckley Cove (near Staatsburg)	lune 21, 1977	Female	\$.5	45.42	0.99		
North Bay (near Hudson)	June 22, 1977	Male	4.8	2.50	0.17	1	
8 miles below Fort Edward	July 20, 1978	Male	9.1	683.00	17.40	0.08	
8 miles below Fort Edward	July 20, 1978	Male	2.7	9.21	n.d.	n.d.	
8 miles below Fore Edward -	July 31, 1978	Male	2.7	21,80	1 0.71	n.d.	
Mean			3.16	1 66 05	[<1.59]	0.03	

احدو ت. اعتبار (۱۹)	مرينون بالاخلو	-	ange.	really.	1370	
			1		3.1	
	10.0				1	
4 44	y said	*4		40.4		
	history.	4		1		
		1. A.D.	L.			
494	de H		300	1	4	
			ألازنها	MONT		
				- Park		WIT A

Other waters Spring Lakes (Dutchess Co.) June 23, 1977 Female Black Pond (near Ellisburg, Jefferson Co.) June 12, 1978 Female 0.038 Black Pond (near Ellisburg, Jefferson Co.) June 12, 1978 Female 7.40 St. Lawrence River (near Morristown) June 12, 1978 Female 0.77 White Creek (Washington Co.) july 21, 1978 Male Black Creek Marsh trear Guilderland Albany Co 1 September 13, 1979 Male While Come Marsh herry to allow a second of the frondement flav (Lake Ontario) September 20, 1978 a

TOXICANISE SNAPPING TURTLES - Stone et al.

and the same sandlings
And the six of the six
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

2000	D: 77 DE					2.72			
100	T CARE	A 100 PM	100		100 100 100 100	100	a Satura		
100 A	4. ASM	14 E	100			A 201 v	200	3.3	
340.6	T T	10.30		100		SEE DATE		12.00	20
150	N (1972)	*S457-2	100	120,10	发现1000	THE WAY	X325 A	AND RESIDEN	947
3.0	23.446	2 24 183	24 653	190	1.45	40.00		BANKAN Y	900
	Sec. 256.6	联级化为	1. 1. 1. 1.	27,733.7	23 TANKE	20 more	A32.1	48 ASK	118
200	3.17.35.0	4.0	1.46		COLUMN TO SERVICE	STATE OF STREET	S 1.7.7 K 4 W	A PARTY OF	2.6
1.00	33467		1.0	SECON	Bar o' Cile	11 Stan 2 S	140 111 1	1 3 T 16	100
138	957794	100	产品等	CHARLES TO	ALCOHOLOS	200	100 miles		930
	200	na and a	e 42 33 6 3	768S	100 300	100	100	建设计算 数据	2000
20.0	1,343,41	HARWES Y	APPENDING.	ATTENNESS OF	Sec Section	(4) 以 (4)	4 Sept. 18	NO. 35	900
1.5	72.74	**************************************	5 18 5 42	Carlo New			17.100		SIL
150	100 120	44 2 C M	KEEPS &	0.630.030	7. 7. Table	F 48.0	Section 1	2005 (1989)	375
1.0	1773	300			4 ME 2 (20)	100.5	100	74.2 M 2 12	250
- 29	T Said	T38 0 44	1962 31		33 E 44 E 55	A 1. Table 1	Constant Contract	CANDOM: (TI	3/14
-15	C. C. C. C.		100		OK #925	1.016	Alexand at	1.54	942
	A 42.07 A	100	N 1000		法的有限		A 15 15 14	distriction.	1.1
1.0	MINE IN	A. 1887	STREET, STREET,	NO COL	5.4753.3		SUPPLY ME		44
	P 2 11. 11	28 1.14	S. 000340	0 W U.		1715274	Section 2	7.7000.00	1.74
200	-81	100000	7 CH: 52	1700 S. C		3 S S S S S S S S S S S S S S S S S S S	4 1 1 2 2 4 6 1	CONT VICTOR	i bila
	30000	125-122	5.5 (E) No.	3012	C 100 P.	1.583.3	0.00.39.03	CONTRACTOR OF THE PARTY.	2.0
100	1215	(A)	PUT SERVICE	20000000	C 30 1 16 2	32 W.		200 PH 100 CO	500
	3.6	EL WATER	242 1863	270.00	CHARLES	12.	A MARKET AND	Mark Street	10.5
- A	September 1	A 12 15 15 15 15 15 15 15 15 15 15 15 15 15	24 B.M	100.00		2 SEE 3	COV.	30.8.40.5	
3.23	26 V W	7. W. D. T.	25.	76.5	XX2 3540	4.00	100	S CONTRACTOR	ΔT
	647.001	BALLE DVS	100	10.5		47 T 18 19 19	4.4.4.	andread	
100	PULC	DATE:	400 N 2 1		N		·		
1973	10.735.0	7 C 1866	THE STATE OF THE			and the	TALKYC W		_
- 10	1.00	100	A. V. M.	4					~.
	42.70	BEAUTY OF THE	20.3			A COMPANY			•
	10 TO	2417 2			3.45			The state of the s	-
	rate est	3. M. C. S. S.	10.05	330 337					-
1.42	子名物面	200	13 6 8	10.0	100	100		法	=
7.30	ALC: N	6. 医红斑	March 1	Sugar Sand	全国扩展数位		- 45		
-12	45.56	ST 18 19 19	0.00	Sec. F.	FEET SECTION	Deck to			

· · · · · · · · · · · · · · · · · · ·	. Cather Maters					
Spring Lakes (Dutchess Co.)	June 23, 1977	Female	2.9	0.48		
Black Pond (near Ellisburg, Jefferson Co.)	June 12, 1978	Female	2.9	3.30	0.038	0.03
Black Pond thear Ellisburg, Jefferson Co.)	June 12, 1978	Female	2.7	7.40	0.049	0.07
St. Lawrence River (near Morrisown)	June 12, 1978	Female	2.4	21.40	0 77	0.08
White Creek (Washington C	1 Tul: 31 1979	Mak	* 1	1,39	ו ה.ח	n.d
Brack Creek Marsh (mear Connections). Albany Co.)	September 15, 1978.	Mare	y 1	11,2,0	na.	4
Black Creek Marsh (near Guilderland, Albany Co.)	September 13, 1978	Male	8.2	0.10	n.d.	n.d.
Irondequoit Bay (Lake Ontario)	September 20, 1978	Male	16.4	27.80	3.58	0.99
Mean			6.0	7.77	0.64	0.17

^{*}Data in ppm on wet weight basis: n.d. indicates substance was tested for but not detectable. §Tissue samples from this specimen pooled with those from preceding specimen.

TABLE 3. TONICANTS IN SAMPLES OF SKELF AT MUSCLE

			1	Gross Weight		. Assimi	
Locality	\smile) Date	Sex	(kilograms)	PCB:	DDE	Dieidrin
		Hudson Riv	er	A	· · · · · · · · · · · · · · · · · · ·		
North Bay (near Tivoli)		June 14, 1976	Female	4.2	11.40	< 0.5	0.019
North Bay (near Tivoli)		June 14, 1976	Male	2.0	l §	§	§
Constitution Island Marsh		June 15, 1976	Female	5.8	0.67	0.015	
Constitution Island Marsh		lune 15, 1976	Female	4.6	1.63	د 4 0.05 ز	n.d.
Constitution Island Marsh		May 19, 1977	Male	8.6	3.45	n.d.	0.01
Constitution Island Marsh		May 19, 1977	Male	1.0	0.31	n.d.	n.d.
Piermont Marsh		May 26, 1977	Male	1.5	0.20	0.01	
Piermont Marsh		May 26, 1977	Female	3.8	0.47	0.01	n.d.
North Bay (near Tivoli)		lune 15, 1977	Male	10.2	1.07	, n.d.	0.01
Vanderburgh Cove (near Staatsburg)		June 13, 1977	Male	15.4	15.70		
North Bay (near Tivoli)		June 14, 1977	Female:	3.Q	0.69	0.01	• • •
Kingston Point		lune 15, 1977	Male	9.1	1.53		
Kingston Point		June 15, 1977	Female	5.4	1.02		• • •
Vanderburgh Cove (near Staatssburg)		June 15, 1977	Male	13.ô	5.27		•
Iona Island Marsh	,	June 20, 1977	Male	5.3	2.07	0.05	
Iona Island Marsh	, \	June 20, 1977	Male	9.4	0.52	n.i.	!
Iona Island Marsh		June 20, 1977	Male	2.2	1 0.19	n.d.	
Iona Island Marsh		June 20, 1977	Male	0.9	0.26	< 0.01	
Suckley Cove (near Staatsburg)		June 21, 1977	Female	3.5	27.62	0.74	1
North Bay (near Hudson)	•	June 99, 1977	Male	4.8	0.25	0.01 کے '	
3 miles below Ford Edward	*	July 20, 1978	1 Maie	9.1	11.40	0.26	n.d.
8 miles below Fort Edward		L July 20, 1978	Male	2.7	3.03	n.d.	0.034
8 miles below Fort Edward		July 31, 1973	efale	2.7	2:50) n.d.	n.d.
Mean		<u> </u>		5.16	4.24.	0.093	0.008

Other waters June 23, 1977 Female Spring Lakes (Durchess Co.) 1 39 60010 001 June 12, 1978 Female Black Pond (near Ellisburg, Jefferson Co.) 1,325, 4 0 31 June 12, 1978 Female 0 11 | 0 015 | < 0 01 funcial, care li t 11 .l.

< 0.010

0.0231

0.025 2 0 01

0.014' 2 0.01

<0.023 < 0.038

0.16

0 39

0.81

0.36

0.44

n an i

TOXICANT

10	
ഗ	
~	
Ž.	
_	
>	
-	
_	
•	
_	
_	
-,	
€.	
_	
APPING	
•	
<u> </u>	
1	
_	
H.I.Y	
-	
~	
_	
-	
т.	
<i>J</i> .	
•	
_	
~,	
_	
_	
=	
_	
Stone	
~	
-	
16	

Ġ

		1		4.8		g and			Š
				4	4	100			1
		in.		S. O.			5 1.	Section .	
			r i						į
				1		344			į
ı	4								į
ı							ü.	4	Ì
۱									i
ı						4		17	å
	1				摄				ì
									ĺ
1	1309		9	4			10	AD)	á

June 23 1977 June 12, 1978

tune 12, 1978

*Data in ppm on wet weight basis: n.d. indicates substance was tested for but not detectable. §Tissue samples from this specimen pooled with those from preceding specimen.

July 51, 1976 September 20, 1978

Female

Female

Female

Mate

Male

16.4

5.12

Spring Lakes (thin bess Co.)
Black Pond (near Ellisburg, Jefferson Co.)
nja 1 month over 1 Holories In Monary Co.)

White Creek (Washington Co.)

Irondequoit Bay (Lake Ontario)

Mean

317776

-	
_	
=	
• '	
2	
7	
.7	
9.	
7.	
CAN'IS IN SNAPI	
7.	
=	
=	
7	
Ŧ	
=	
Z	
ŽŽ.	
•••	
Ę	
Æ	
-	
11.53	
=	
77	
~	
ï	
•	
3,4	
-	
-	
~	
-	

138V 1980

Mean		5.12 · · · · ·	0.44	<0.025	< 0.038
Spring Lakes (Dutchess Co.) Black Pond (near Ellisburg, Jefferson Co.) Black Pond (near Ellisburg, Jefferson Co.) Black Pond (near Ellisburg, Jefferson Co.) St. Lawrence River (near Morristown) White Creek (Washington Co.) Irondequoit Bay (Lake Ontario) June 23, 1977 June 12, 1978 Male September 20, 1978 Male	ale ale ale	2.9 2.7 2.4 3.4 16.4	0.59 0.81 0.54 0.48 0.56	0.013 0.042 0.023	< 0.01 < 0.01 n.d. 0.16

^{*}Data in ppm on wet weight basis; n.d. indicates substance was tested for but not detectable. §Tissue samples from this specimen pooled with those from preceding specimen.

TABLE 4. TOXICANTS IN EGGS OF SNAPPING TURTLES FROM THE HUDSON RIVER

-		Gross weight*	Toxicantg			
Locality	Date	(kilograms)	PCB's	DDE	Dieldrin	
North Bay (near Tivoli)	June 14, 1976	1 4.2	17.9	< 0.05	0.022	
Constitution Island Marsh	June 15, 1976	3.8	42.9	< 0.05	0.019	
Constitution Island Marsh	lune 15, 1976	1.6	15.7	0.36	< 0.050	
Piermont Marsh	May 26, 1977	3.9	10.4	0.055	610.0	
North Bay (near Tivoli)	June 14, 1977	3.9	20.9		0.013	
Suckley Cove (near Staatsburg)	june 21, 1977	3.5	32.7		0.055	
Mean		3.97	28.9	< 0.18	< 0.035	

*Of parent female. §Data in ppm.

y 198 0

exceeding ϕ ppm. Such tissues from six furtles from other localities averaged ϕ 14 ppm. The levels of DDE and Dieldrin in skeletal muscle were all ϕ ite low.

All six ag samples were from tittles from the Hudson River and had consideral to concentrations (> 5.0 ppm) of PCB's (mean = 28.9 ppm). Levels of apDE and Dieldrin were low.

Tests f_{ℓ} statistical differences between turtles from the Hudson River and those from other localities, with respect to mean concentrations of PCB's in the fat, liver and skeletal muscle, are summarized in Tables 5 and 6. Both the F and f' tests indicated that there were significant differences, for the timues analyzed, between the two areas.

The soap made from the turtle from the Hudson River yielded 230 ppm of PCB's, while that from the one from White Creek yielded 0,091 ppm. A single box 1 of the former (250 milliliters = 270 grams) would contain a dose of 624 milligrams of PCB's. The tissues analyzed for the turtle from the Hudson River showed PCB levels of 7,258 in its fat, 683 ppm in its liver and 11.4 ppm in its skeletal muscle. The corresponding values for the other turtle were 2,281, 1.4 and 0.5 ppm, respectively. Despite the fact that the fartle from White Creek had lower amounts of PCB's in its tissues than the one from the Hudson River, removing the fat from the portions used in preparing the soup apparently was effective in reducing the relative amount of it to a much greater degree.

Table 5. RESULTS OF F TESTS OF THE VARIANCE OF PCB CONCENTRATIONS IN TISSUS OF SNAPPING TURLIES FROM THE HOBSON RIVER VS. OTHER LOCALITIES IN NEW YORK

Tise is	Locality	Number	Sum of squares	Value of F
Fac	Hudson River	10	8.911.722.49	
	Üther	9	512,102.88	17,461
Liver	Hudson River	22	21,200.77	
	Other	8	116.52	181,95*
Skeletal mascle	Hudson River	22	45.58	
	Other	6	0.04	1,159,45*

[&]quot;Signific. A at P = < 0.001.

TABLE 6 RESULTS OF PTESTS OF DIFFERENCES BETWEEN MEAN VALUES FOR PCB CONCERN FRATIONS IN POSSES OF SNAPPING TORESTS FROM THE HUBSON RIVER VS. OTHER LOCALITIES IN NEW YORK

	Value of P		
Lissue	Critical	Calculated	
ful	2.26	2.59*	
lwer	1.75	1.83*	
Skeletal i iusele	1.73	2 (4)	
	· ·		

Significant at P < 0.05.

we cost = x=28.50

230 cm

The two snapping turtles whose tissue samples were pooled were both taken on June 14, 1976 from North Bay at Tivoli on the Hudson River. The pooled sample of liver and that of skeletal muscle each had less than 0.06 ppm of cadmium. However, for four turtles from the Hudson Fiver at Constitution Island Marsh, two taken on June 15, 1976 and two on May 19, 1977, the mean and range of cadmium concentrations were 16.99 (8.58-26.20) ppm in the liver and 0.77 (0.12 - 1.41) ppm in the skeletal muscle. Turtles seem to be able to tolerate large concentrations of cadmium (Robinson and Wells, 1975), but further research is needed.

DISCUSSION

These data demonstrate that the fat, liver and eggs (tissues that usually contain higher lipid levels than other tissues) of snapping turtles contain greater concentrations of organochlorine toxicants than does skelerel muscle. They also indicate that turtles from the Hudson River ontain significantly higher levels of PCB's than turtles from the other localities from which specimens were obtained. In addition to toxicants a ceived through diet, the snapping turtle may acquire hydrophobic compands, such as PCB's, through its mucous membranes during aquatic phayngeal and cloudal respiration (Hammer, 1969).

The U.S. Food and Drug Administration has recognized no pecific tolerances or action levels for deleterious substances in snapping urites. However, the agency's sanctioned levels for human consumption of the edible portion of fish are as follows: PCB's, 5.0; DDE, 5.0; Dieldr v. 0.3; heptachlor epoxide, 0.3; Mirex, 0.1; and mercury, 1.0 (U.S. Feed and Drug Administration, 1978).

In light of the findings of the present study, snapping turtles from the Hudson River, below Hudson Falls Fort Edward, appear unsafe for human consumption. Although the skeletal muscle was generally low in organochlorine residues, leaving a small amount of fat on the meast could result in elevated contaminant levels in soups and stews. In recipies that also use the liver and/or eggs, the tisk of high levels of contaminants is even greater. More data are needed for snapping turtles from Lake Ontario and other areas (e.g., Lake Eric, Onondaga Lake and Lake Champlain), but the data for the specimens from Irondequoit Bayinggest that turtles from Lake Ontario may also be unfit for human consumption. Snapping turtles taken anywhere should be prepared carefully at leven small amounts of fat as well as the liver rejected as human food.

Little research has been done on pesticides and indistrial polluents in reptiles. Snakes have been proposed as pollution-indicator species (Faucile et al., 1975), and alarmingly high levels of some organical organical were found in the body fat of a small sample of indigo snakes (Drynerchon corais) from Georgia (Lawler, 1977). However, the concentrations of

snace three polls can war from

196 lipio for to dios or Seco

son P

like

poller.
However
and si
the lea
In actor

of the l are de. neck o labor d

tral · ..

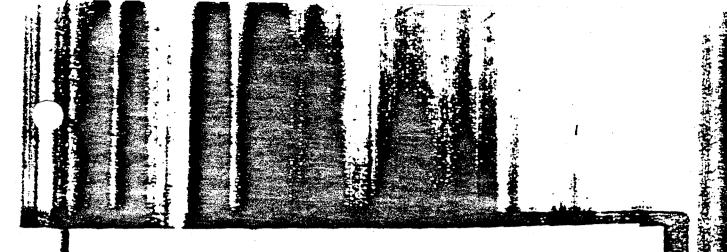
CARR
EUNE |
Less
Connect
| a point
HAMMI
| South
| Mono
| Hight |
LAMER

Aram.

Barrie Sper

Person t tions is Remove strong Eleter

Sual.



TOXICANTS IS A SPING TURILES - Stone et al.

organochlorim reported in these snakes were lower than those found in snapping turtl during the present study in New York.

The adipa tissue may accumulate organochlorine toxicants throughout the life of a turtle. In order to monitor trends in the degree of pollutant communication, the concentrations of specific toxic substances can be compared according to age for turtles from selected bodies of water. Age can be estimated from counts of scute annuli (small turtles), from carapace, ength and, perhaps, by microscopically counting the ringlike formation in sections of the long bones of larger turtles (Gibbons, 1968; Hammer 1960). Since snapping turtles hold high concentrations of lipid-soluble on itaminants in their fat bodies, these organs should be ideal for GC/mass - ectrophotometry analysis for a variety of compounds (e.g., dioxin, diben. Juran and polynuclear aromatic hydrocarbons).

Snapping to des appeared to be abundant, at least locally, in the I fud son River (c.: North Bay at Tivoli, Vanderburgh Cove), so chemical pollucants has not noticeably reduced populations in those areas. However, tese ich is needed concerning the impact of organochlorines and other poll dants on the health and behavior of snapping turtles and the hatchabilia of their eggs.

In addition the snapping turtle should prove a useful laboratory animal for toxicology studies. Large far bodies (Pond, 1978) are found on the ventral side of the esturiles and extend from the vicinity of the medial aspect of the hind lines to, in obese individuals, the area of the heart. Also, there are discrete far deposits in the axial, pericardial, and lateral and ventral neck regions. I hese adipose tissues can be quickly and easily collected for laboratory chemical analyses.

LITERATURE CITED

Anoter, B. 1970. Sourmei Cooking For Free, Stackpole Co., Harrishing, Pa.

BACTREE B., D. 1. SPENCER AND W. WIRLLER, 1975. The use of snakes as pollution indicator species. Copera / 975(2):367-368.

CARR A. F. 1952 Handbook of Parties, Cornell Phiv. Press, Ithaca.

ERNNI C. 11. 35. 3. W. BARBOOK 1972, Turtles of the United States, Kentucky Univ. Press. Lexington.

Gibbons, J. W. 1 s. Growth rates of the common snapping turtle, Chelydra serpentina, in a polluted cave Herperologica 24:266-267. HASIMER, D. A.

 Parameters of a marsh snapping untle population, Lacreck Retuge. ur. Wildl. Mgr. 33:995-1005

· S. A. Hirr. 1974. Nationwide organic bloring and mercury resulte on nallards and plack docks during the 1969-1970 hunting season. Pest.

Monitor Jour. HIRLLY, J. 1978 sappin' tuctle (ales. Ontario Ont-of Doors (March):16-18, 62.

LAWLER, H. E. 19-7. The status of Drymarchan carais competi (Hollmook) the casteric indige snake, in the seatheastern United States, Herpetol. Rev. 8(3):76-79.

Posts C. M. 197. Morphological aspects and the mechanical consequences of fat distribution in wild verbrates. Annual Rev. Fool. Syst. 9:519-570.

ROBINSON K. M. AND M. R. W1145 1975. Recention of a single oral dose of cadminum in tissues of the oftshell mitte. Trionyx spinifer Bull Environ. Contain. Toxicol 14(6):750-752

ιħ .13)

31 9.

m

lly : 111

1111

fic

.3:

he an

itt del 1.11 . i.

*31

South Daketta

HIAM, R. G., A

wings of adult

481. 1.11

in

P. SUBACHE J. S., AND M. R. BECKER, 1931, Joy of Cooking, Bobbs Merrill Co., Indianap So yet ARS C. B. 1949. Snapping turtle, N.Y.S. Conservationist 4:40,

* 111 B. G. D. AND J. H. TORRIE. 1960. Principles and Procedures of Statistics. McG. ttill Book tor New York.

1. S. From V. o Derr. Administration, 1968, Pesticide Analytical Manual, Vol. 1, 2nd each, 211 and 311 (revised July 1969, July 1970, April 1971).

1978. Action levels for poisonous or deleterious substances, U.S. G.

Contine Office

AND HO

Patte ip on several fishermen . these fedicabehavior to tions, but it groups with responsible fishing inch-

tends to warm a matter li perience tep vironment 4 group, by m fish song! coastal ze ec enterprise le recognitie surveys of all 1975. One va commerce ! p

goals, the

The paragraph

This is search while the a Credit is de 12--