

LEVELS OF CONCENTRATION AND INCIDENCE OF VARIOUS PESTICIDE  
TOXICANTS IN SOME SPECIES FROM SELECTED BAY AREAS

Project MP-R-4  
Job 1

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ABSTRACT

Tissue samples analyzed indicate the residues of some pesticides are present in all Texas bay areas sampled. The residues detected are DDT, Dieldrin and Endrin. The incidence of DDT residues decreased slightly in both oyster, Crassostrea virginica, and fish samples during the study period. The incidence of Dieldrin increased dramatically in oyster samples while decreasing slightly in fish samples. The incidence of Endrin remained essentially unchanged. Ovaries of speckled trout, Cynoscion nebulosus, examined contained enough DDT residue to cause concern over the possible impairment of reproductive ability.

INTRODUCTION

Oyster tissue samples have been taken at monthly intervals since July, 1965, and fish tissue samples have been taken at monthly intervals since January, 1967. These samples have been analyzed for pesticide residue. Oyster tissue samples have been taken from six selected bay areas, and fish tissue samples from four selected bay areas. Additional random samples were prepared from selected tissues of some predator species.

All of the samples taken were analyzed to determine the levels of residue present. These data have shown seasonal variations in the concentration levels in oyster and fish tissue samples. Additional data are being accumulated from other sample types, but further research is needed to reinforce this area of investigation.

MATERIALS AND METHODS

Oyster tissue samples were taken from the Galveston, Matagorda, San Antonio, Aransas, Corpus Christi Bay areas, and the lower Laguna Madre, including the Arroyo Colorado. Fish tissue samples were taken from the Matagorda, San Antonio, and Corpus Christi Bay areas, and the Arroyo Colorado in the lower Laguna Madre. These fish samples were composed of available species, but normally were either mullet, Mugil cephalus, menhaden, Brevoortia tyrannus, or spot croaker, Leiostomus xanthurus. Random tissue samples prepared from various body organs of selected species, or whole body samples of other species, were taken from all of the above named areas and from the Gulf of Mexico.

The oyster, fish, and random species tissue samples were prepared and analyzed for pesticide residues as described by Childress, 1966, 1967 (see Lit. Cit.).

## RESULTS

### Levels of Concentration of Oyster Tissue:

Galveston Bay area - Pesticide residue analysis of samples taken from the Galveston Bay area (Table 1) revealed the presence (Table 2) of DDT\* and Dieldrin. The DDT residue levels ranged from none detected to .073 ppm. The peak concentration was in October. Residue was found all months of the year. Dieldrin residue ranged from none detected to .025 ppm, and was found in January, February, March, November, and December. Peak concentration was in February.

Matagorda Bay area - Analysis of samples from this area revealed the presence of DDT and Dieldrin residues. DDT residues were found in these samples each month of the year. The residue level ranged from a trace to .974 ppm. The peak residue was found in April. Dieldrin was found in April at a level of .018 ppm and in June at a level of .024 ppm.

San Antonio Bay area - Samples were inconsistent from this area due to flood waters' killing oyster stock used in sample preparation. One sample per month was prepared from April through December. The DDT residue level ranged from none found to .488 ppm. The month of peak residue was August. Dieldrin residue of .056 ppm was found in April and .014 ppm in August. Endrin residue was found once in April at a level of .010 ppm.

Aransas Bay area - Residue analysis of samples taken from this area revealed the presence of DDT and Dieldrin. The DDT residue level ranged from none detected to .093 ppm. The month of peak residue was February. DDT residues were not detected August through December, and in March. Dieldrin residue was present each month samples were prepared. The residue level ranged from none detected to .160 ppm. Peak residue level was in March.

Corpus Christi Bay area - The only residue detected in these samples was that of DDT. The concentration ranged from none detected to .088 ppm. The month of peak residue was March.

Lower Laguna Madre area - Samples from this area were prepared in January, March, and December. In these samples DDT and Dieldrin residues were found. The DDT residue ranged from .198 ppm to .453 ppm. The peak residue was in January. Dieldrin residue ranged from none detected to .033 ppm. The peak residue was in December.

### Incidence of Pesticides In Oyster Tissue:

The incidence of DDT residue has decreased slightly while the residues of Dieldrin and Endrin have increased in oyster tissue samples (Figure 1).

In 1965, 89 percent of the oyster tissue samples examined contained DDT residues. This dropped to 81 percent in 1966, increased slightly to 83 percent in 1967, and then dropped to 69 percent in 1968

\* DDT, as reported here, includes DDT and its two metabolites, DDD and DDE.

Table 1: Station Locations

Oyster Tissue Samples

Area	Station	Description
Galveston Bay area	#1	Todd's Dump
	#2	Beasley's Reef or Frenchy's Reef
Matagorda Bay area	#1	Tres Palacios Bay
	#2	Lavaca Bay (mouth of Lavaca River)
San Antonio Bay area	#1	Abandoned
	#2	Panther Point Reef
Aransas Bay area	#1	Key Allegro or Goose Island
	#2	St. Charles or Copano Bay
Corpus Christi Bay area	#1	Causeway Reef
	#2	Steadman Reef (Redfish Bay)
Lower Laguna Madre	#1	Arroyo City (Arroyo Colorado)
	#2	Three Islands

Fish Tissue Samples

Area	Station	Description
Matagorda Bay area	#1	Lavaca Bay
	#2	Tres Palacios Bay
San Antonio Bay area	#1	Drainage ditch near Seadrift
	#2	Guadalupe Bay
Corpus Christi Bay area	#1	Oso Bay
	#2	Tule Lake
Lower Laguna Madre	#1	Port Harlingen
	#2	Arroyo Colorado (ICW Mk. 54)

Table 2: Pesticide Monitoring Analysis Data  
Chemical Found--Parts Per Million

Oyster Tissue

<u>Area &amp; Date</u>	<u>Station</u>	<u>DDT*</u>	<u>Dieldrin</u>	<u>Endrin</u>
<u>Galveston Bay</u>				
<u>area:</u>				
January	1	.034	.013	----
	2	.011	----	----
February	1	.059	.025	----
	2	tr.	----	----
March	1	.036	.020	----
	2	tr.	----	----
April	1	.051	----	----
	2	.011	----	----
May	1	.066	----	----
	2	tr.	----	----
June	1	.041	----	----
	2	----	----	----
July	1	.030	----	----
	2	----	----	----
August	1	.013	----	----
	2	tr.	----	----
September	1	.015	----	----
	2	----	----	----
October	1	.073	----	----
	2	.010	----	----
November	1	.034	.010	----
	2	tr.	----	----
December	1	.049	.014	----
	2	NSP	NSP	NSP
<u>Matagorda Bay</u>				
<u>area:</u>				
January	1	.419	----	----
	2	.081	----	----
February	1	.487	.018	----
	2	.095	----	----
March	1	.334	----	----
	2	.079	----	----
April	1	.974	----	----
	2	.181	----	----
May	1	.399	----	----
	2	.119	----	----
June	1	.153	----	----
	2	.400	.024	----
July	1	.174	----	----
	2	.615	----	----
August	1	.143	----	----
	2	NSP	NSP	NSP
September	1	.062	----	----
	2	.065	----	----

Table 2: Continued

<u>Area &amp; Date</u>	<u>Station</u>	<u>DDT*</u>	<u>Dieldrin</u>	<u>Endrin</u>
<u>Matagorda Bay area:</u>				
October	1	.032	----	----
	2	tr.	----	----
November	1	.041	----	----
	2	.033	----	----
December	1	.039	----	----
	2	.037	----	----
<u>San Antonio Bay area:</u>				
January	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
February	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
March	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
April	1	NSP	NSP	NSP
	2	.053	.056	.010
May	1	NSP	NSP	NSP
	2	tr.	----	----
June	1	NSP	NSP	NSP
	2	----	----	----
July	1	NSP	NSP	NSP
	2	----	----	----
August	1	NSP	NSP	NSP
	2	.488	.014	----
September	1	NSP	NSP	NSP
	2	----	----	----
October	1	NSP	NSP	NSP
	2	----	----	----
November	1	NSP	NSP	NSP
	2	----	----	----
December	1	NSP	NSP	NSP
	2	tr.	----	----
<u>Aransas Bay area:</u>				
January	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
February	1	.093	.021	----
	2	.046	.027	----
March	1	----	.160	----
	2	----	.140	----
April	1	.045	.019	----
	2	.054	.020	----
May	1	tr.	.016	----
	2	.058	.016	----
June	1	.012	.016	----
	2	----	.010	----

Table 2: Continued

Area & Date	Station	DDT*	Dieldrin	Endrin
July	1	tr.	----	----
	2	tr.	.014	----
August	1	----	.026	----
	2	----	.025	----
September	1	----	.041	----
	2	----	.039	----
October	1	----	.048	----
	2	----	.053	----
November	1	----	.051	----
	2	----	.030	----
December	1	----	.069	----
	2	----	.066	----
<u>Corpus Christi</u>				
<u>Bay area:</u>				
January	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
February	1	NSP	NSP	NSP
	2	.037	----	----
March	1	.088	----	----
	2	.063	----	----
April	1	NSP	NSP	NSP
	2	.082	----	----
May	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
June	1	NSP	NSP	NSP
	2	.030	----	----
July	1	NSP	NSP	NSP
	2	.031	----	----
August	1	NSP	NSP	NSP
	2	.028	----	----
September	1	NSP	NSP	NSP
	2	.049	----	----
October	1	NSP	NSP	NSP
	2	.021	----	----
November	1	NSP	NSP	NSP
	2	----	----	----
December	1	NSP	NSP	NSP
	2	.027	----	----
<u>Lower Laguna</u>				
<u>Madre area:</u>				
January	1	NSP	NSP	NSP
	2	.453	.012	----
February	1	NSP	NSP	NSP
	2	NSP	NSP	NSP

Table 2: Continued

Area & Date	Station	DDT*	Dieldrin	Endrin
<u>Lower Laguna Madre area:</u>				
March	1	.198 <sup>a</sup>	----	----
	2	NSP	NSP	NSP
April	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
May	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
June	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
July	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
August	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
September	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
October	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
November	1	NSP	NSP	NSP
	2	NSP	NSP	NSP
December	1	.277	.033	----
	2	NSP	NSP	NSP

NSP -- No Sample Prepared

---- Sample prepared and examined, but no pesticides found.

tr. -- Trace (less than .010 ppm)

Description of Areas:

Galveston Bay area - Galveston, Trinity, East, and West Bays

Matagorda Bay area - Tres Palacios, Matagorda, and Lavaca Bays

San Antonio Bay area - San Antonio, Espiritu Santo, and Guadalupe Bays

Aransas Bay area - Aransas, Copano, and St. Charles Bays

Corpus Christi Bay area - Corpus Christi, Nueces, Oso, and Redfish Bays

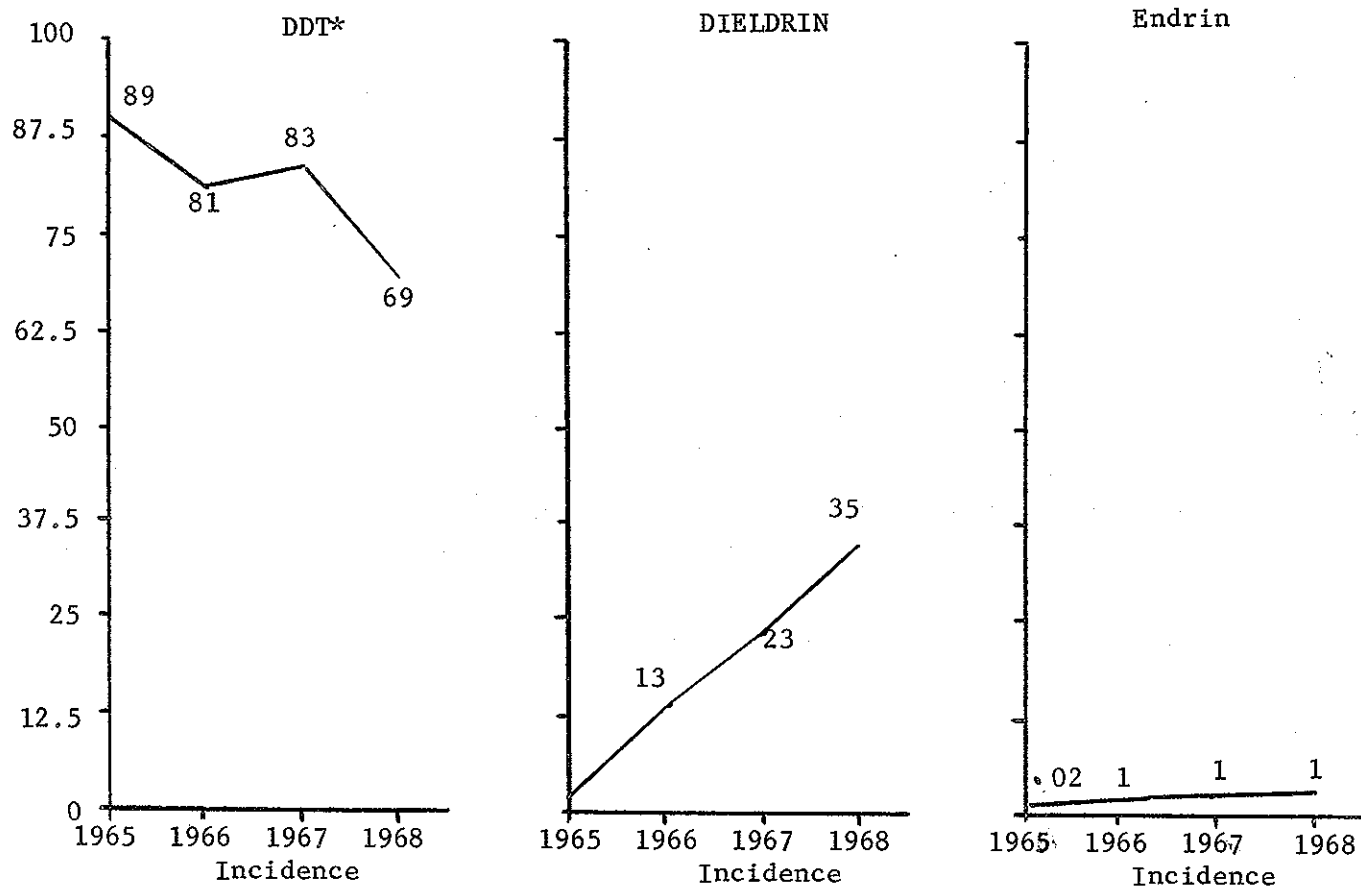
Lower Laguna Madre - the lower Laguna Madre, South Bay, and the Arroyo Colorado

\* DDT, as reported here, includes DDT and its two metabolites, DDD and DDE.

<sup>a</sup> Port Isabel transplant to Arroyo City

Figure 1: Incidence of pesticides in oyster tissue

1965 data based on 54 samples  
1966 data based on 132 samples  
1967 data based on 125 samples  
1968 data based on 91 samples



\*DDT as used here is DDT plus its metabolites DDD and DDE.



During this same period the incidence of Dieldrin residue rose from 1 percent in 1965 to 35 percent in 1968.

Endrin was found rarely in the 1965 samples, and the occurrence has risen to 1 percent and remained at this level since 1966.

#### Levels of Concentration in Fish Tissue:

Matagorda Bay area - Residues of DDT and Dieldrin were found in samples taken in this area (Table 3). The residue of DDT was found in samples each month of the year. The concentration ranged from a trace to .540 ppm. The month of peak residue was January. Dieldrin residue was found in January, March, and June. The peak residue was .018 ppm found in January.

San Antonio Bay area - The residues of DDT and Dieldrin were found in samples from this area. The concentration of DDT residue ranged from none detected to 2.800 ppm. The month of peak concentration was July. Dieldrin residue ranged from none detected to .052 ppm. The month of peak concentration was April.

Corpus Christi Bay area - The residues of DDT and Dieldrin were found in samples from this area. The residue of DDT was found in all samples analyzed and ranged in concentration from .030 ppm to 1.400 ppm. Dieldrin residue ranged from none found to .120 ppm. The month of peak residue was January.

Lower Laguna Madre area - In this area the residue of DDT was found in all samples analyzed. The concentration ranged from .130 ppm to 8.100 ppm. The month of peak concentration was February. Dieldrin residue ranged from none detected to .280 ppm. The month of peak residue was March. Endrin residue ranged from none detected to .073 ppm. The month of peak residue was February.

#### Incidence of Pesticides in Fish Tissue:

The residue of DDT was found in all fish samples examined in 1967, and remained at essentially the same level of occurrence through 1968 (Figure 2).

Dieldrin residue was found in 54 percent of the samples in 1967 and decreased to about 46 percent of the samples in 1968.

Endrin residue was found in 11 percent of the fish samples in 1967 and increased to almost 13 percent of the samples in 1968.

#### Levels of Concentration in Random Samples:

The results from random samples are shown in Table 4. These samples include fish, oyster, and shrimp tissue, and one sample of bird eggs.

Table 3: Pesticide Monitoring Analysis Data  
Chemical Found--Parts Per Million

Fish Tissue

<u>Area &amp; Date</u>	<u>Station</u>	<u>DDT*</u>	<u>Dieldrin</u>	<u>Endrin</u>
<u>Matagorda Bay</u>				
<u>area:</u>				
January	1	.540	.018	----
	2	.309	.016	----
February	1	NSP	NSP	NSP
	2	.333	----	----
March	1	NSP	NSP	NSP
	2	.292	.012	----
April	1	.057	----	----
	2	.444	----	----
May	1	.071	----	----
	2	.198	----	----
June	1	.049	----	----
	2	.256	.011	----
July	1	.118	----	----
	2	.131	----	----
August	1	.104	----	----
	2	.062	----	----
September	1	tr.	----	----
	2	.121	----	----
October	1	.018	----	----
	2	.182	----	----
November	1	.053	----	----
	2	.160	----	----
December	1	.080	----	----
	2	.246	----	----
<u>San Antonio</u>				
<u>Bay area:</u>				
January	1	.600	.041	----
	2	.088	.016	----
February	1	.600	.026	----
	2	.188	.022	----
March	1	.790	.049	----
	2	.910	.036	----
April	1	.960	.052	----
	2	.920	.040	----
May	1	1.110	----	----
	2	.117	----	----
June	1	.660	----	----
	2	.092	----	----
July	1	2.800	----	----
	2	.107	----	----
August	1	----	----	----
	2	.071	----	----
September	1	.219	----	----
	2	.042	----	----

Table 3: Continued

<u>Area &amp; Date</u>	<u>Station</u>	<u>DDT*</u>	<u>Dieldrin</u>	<u>Endrin</u>
<u>San Antonio</u>				
<u>Bay area:</u>				
October	1	.046	----	----
	2	.103	.010	----
November	1	.251	.011	----
	2	----	----	----
December	1	.117	.022	----
	2	tr.	----	----
<u>Corpus Christi</u>				
<u>Bay area:</u>				
January	1	.500	.120	----
	2	.283	.017	----
February	1	.490	.074	----
	2	.278	.037	----
March	1	.530	.024	----
	2	.111	----	----
April	1	.490	----	----
	2	.630	.099	----
May	1	1.270	.043	----
	2	.430	.032	----
June	1	.120	----	----
	2	.089	----	----
July	1	.310	----	----
	2	.198	----	----
August	1	.279	----	----
	2	.063	----	----
September	1	.097	----	----
	2	.047	----	----
October	1	1.400	.010	----
	2	.274	----	----
November	1	.030	----	----
	2	.196	----	----
December	1	.380	.016	----
	2	.151	.016	----
<u>Lower Laguna</u>				
<u>Madre area:</u>				
January	1	6.200	.110	.021
	2	4.000	.067	.022
February	1	8.100	.250	.073
	2	6.500	.120	.057
March	1	6.400	.280	.034
	2	3.790	.120	.029
April	1	.710	.120	.033
	2	2.360	----	----
May	1	2.670	.130	.018
	2	.845	.018	----
June	1	4.250	.051	----
	2	.169	----	----

Table 3: Continued

<u>Area &amp; Date</u>	<u>Station</u>	<u>DDT*</u>	<u>Dieldrin</u>	<u>Endrin</u>
<u>Lower Laguna</u>				
<u>Madre area:</u>				
July	1	4.110	.056	----
	2	.130	----	----
August	1	4.760	.073	.039
	2	.660	.021	.012
September	1	3.300	.120	----
	2	.329	----	----
October	1	5.430	.190	.043
	2	.138	----	----
November	1	7.530	----	----
	2	1.690	----	----
December	1	4.170	.066	.013
	2	.361	.013	----

NSP -- No Sample Prepared

---- Sample prepared and examined, but no pesticides found.

tr. -- Trace (less than .010 ppm)

Description of Areas:

Matagorda Bay area - Tres Palacios and Lavaca Bays

San Antonio Bay area - Guadalupe Bay and the Seadrift drainage ditch into San Antonio Bay

Corpus Christi Bay area - Oso Bay and Tule Lake

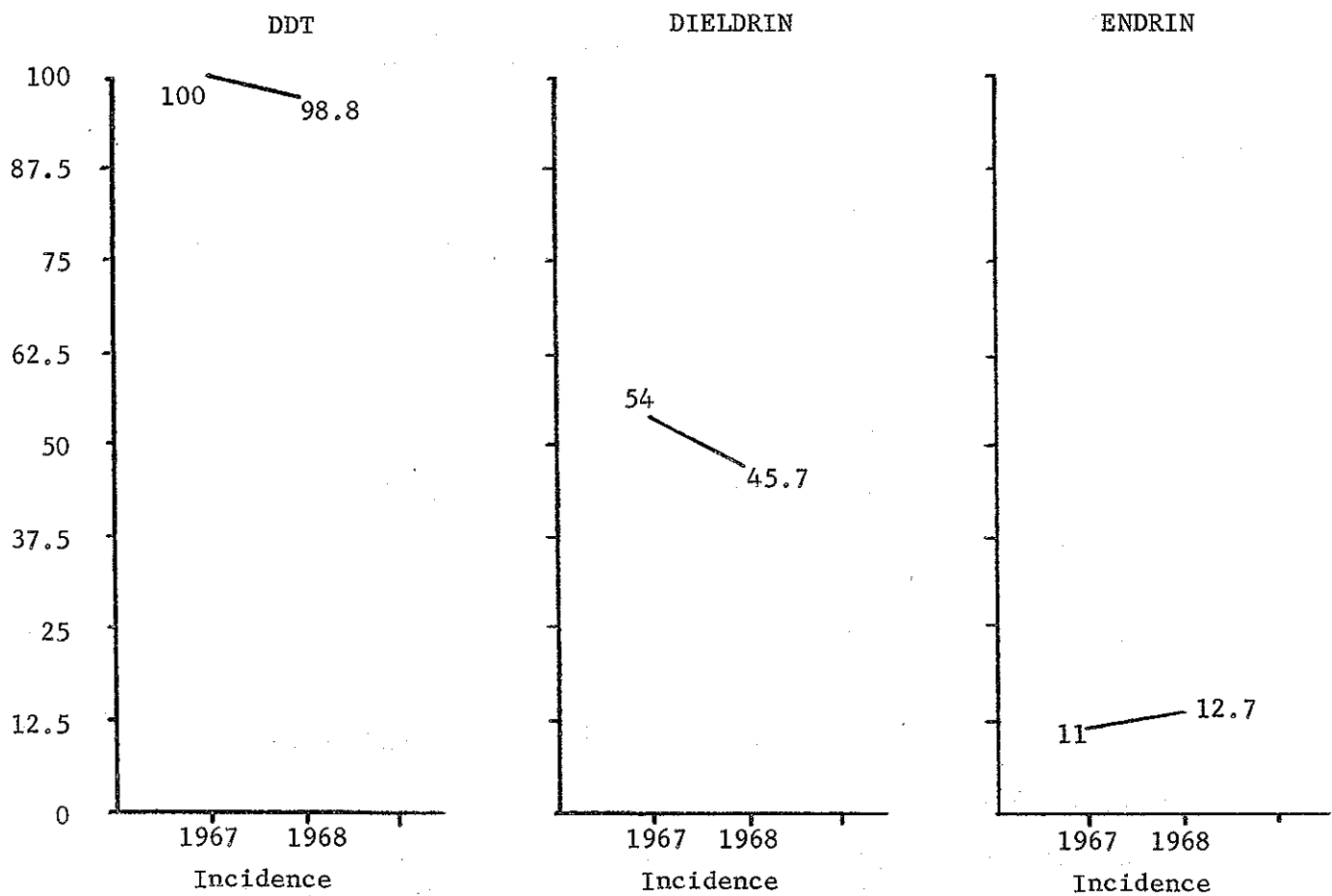
Lower Laguna Madre area - the Arroyo Colorado (this has been dredged to form the Harlingen Barge canal)

\* DDT, as reported here, includes DDT and its metabolites, DDD and DDE.

Figure 2: Incidence of Pesticides in Fish Tissue

1967 Data Based on 89 Samples

1968 Data Based on 94 Samples



\* DDT as used here is DDT plus its metabolites DDD and DDE

Table 4: Pesticide Monitoring Analysis Data  
Chemical Found--Parts Per Million

Random Tissue Samples

Area & Date	DDT*	Dieldrin	Endrin
<u>Galveston Bay area:</u>			
September 1	.267	.054	----
(Clear Creek)			
2	.339	.082	----
3	.560	.270	----
<u>Matagorda Bay area:</u>			
June Palacios Marina	.245	----	----
<u>San Antonio Bay area:</u>			
March San Antonio River	1.740	.310	----
June Seadrift			
Liver	1.149	----	----
Gonad	.760	.043	----
Brain	16.100	.089	----
Body tissue	.346	----	----
Sample Type - Mullet - <u>Mugil cephalus</u>			
July Espiritu Santo Bay			
Liver	.485	----	----
Gonad	.436	----	----
Body tissue	.084	----	----
Sample Type - Speckled trout - <u>Cynoscion nebulosus</u>			
<u>Mesquite Bay</u>			
Fish/Yolk Sac	1.210	----	----
Sample Type - Sea catfish - <u>Galeichthys felis</u>			

Table 4: Continued

Area & Date		DDT*	Dieldrin	Endrin
<u>San Antonio Bay</u> area:				
July	Ayers Bay	1	.967	----
		2	7.400	----
			Sample Type - Heron Eggs - <u>Ardea herodias</u>	
	Panther Pt.			
	Brain		----	----
	Gonad	.274	----	----
	Liver	.220	----	----
			Sample Type - Speckled trout - <u>Cynoscion nebulosus</u>	
August				
	Guadalupe Bay			
	Brain	1.145	----	----
	Liver	.084	----	----
	Body Flesh	.110	----	----
			Sample Type - Mullet - <u>Mugil cephalus</u>	
	Shoalwater Bay			
	Body Flesh	.011	----	----
	Heart	.024	----	----
	Brain	.027	----	----
	Liver	6.000	----	----
	Kidney	.056	----	----
	Gonad	.017	----	----
			Sample Type - Shark - <u>Carcharhinus limbatus</u>	
	Panther Point			
	Liver	.281	----	----
	Gonad	.174	----	----
	Brain	.052	----	----
	Body Flesh	tr.	----	----
			Sample Type - Speckled trout - <u>Cynoscion nebulosus</u>	
November				
	Hynes Bay			
	Liver	.370	.027	----
	Gonad	----	----	----
	Gills	----	.014	----
	Body Flesh	----	----	----
			Sample Type - Redfish - <u>Sciaenops ocellata</u>	

Table 4: Continued

Area & Date	DDT*	Dieldrin	Endrin
<u>San Antonio</u>			
<u>Bay area:</u>			
December			
Turtle Reef			
White Shrimp	----	----	----
	Sample Type - White shrimp - <u>Penaeus setiferus</u>		
Victoria Canal, Mouth			
Anchovy	.063	----	----
Victoria Canal, DuPont Basin			
Anchovy	.154	----	----
Victoria Canal, III			
Anchovy	.048	----	----
	Sample Type - Anchovy - <u>Anchoviella mitchilli</u>		
<u>Aransas Bay</u>			
<u>area:</u>			
July			
Shamrock Cove			
Ovaries	.540	----	----
	Sample Type - Speckled trout		
<u>Corpus Christi</u>			
<u>Bay area:</u>			
November			
Red Fish Bay			
Body Flesh	.051	----	----
	Sample Type - Black drum - <u>Pogonias cromis</u>		
December			
Nueces Bay			
Shrimp	.063	----	----
	Sample Type - Shrimp - <u>Penaeus duorarum</u> & <u>P. setiferus</u>		



Table 4: Continued

Area & Date	DDT*	Dieldrin	Endrin
<u>Lower Laguna Madre</u> area:			
March			
Arroyo City			
Ovaries	3.990	.170	.054
	Sample Type - Speckled Trout		
April			
Arroyo City			
Ovaries	6.110	.140	.029
	Sample Type - Speckled Trout		
June			
Fish/Yolk Sac	4.520	.038	----
I.C.W. Mk. 73	Sample Type - Sea Catfish - <u>Galeichthys felis</u>		
Arroyo City			
Gonad	5.620	.020	----
	Sample Type - Speckled Trout		
July			
Arroyo City			
Gonad	4.720	----	----
	Sample Type - Speckled Trout		
Parker Lake			
Liver	7.560	----	----
	Sample Type - Black Drum		
August			
Arroyo City			
Liver	7.560	----	----
Brain	.958	----	----
Ovaries	6.280	.028	.017
	Sample Type - Speckled Trout		
September			
Arroyo City			
Ovaries	7.980	.042	----
	Sample Type - Speckled Trout		
October			
Arroyo City			
Shrimp	.089	----	----
	Sample Type - White Shrimp		

Table 4: Continued

Area & Date	DDT	Dieldrin	Endrin
November			
Arroyo City			
Ovaries	2.610	----	----
	Sample Type - Speckled Trout		
December			
Arroyo City			
Ovaries	1.260	.037	----
	Sample Type - Speckled Trout		
<u>Gulf of Mexico:</u>			
August			
50 Miles South of Port Aransas			
Liver	.088	----	----
Gonad	.104	----	----
Brain	.155	----	----
Flesh	tr.	----	----
	Sample Type - Red Snapper - <u>Lutjanus aya</u>		

tr. - Trace (less than 0.010 parts per million)

---- Sample prepared and examined, but no pesticide residue found.

\* - DDT, as reported here, includes DDT and its metabolites DDD and DDE.

## DISCUSSION

The toxicity of pesticides and many other poisons varies considerably between phyla, classes, and species of animals. Young animals are usually more susceptible to poisons than are the older animals.

Durham (1967) stated that the concept which underlies many of the interactions of pesticides with other factors involves the detoxifying enzyme systems in the liver microsomes. The sensitivity of the newborn of most species to poisons seems to correlate with the lack of microsomal activity in the neonatal liver.

Probably all environmental factors contribute to some extent in determining the toxicity of pesticides to animals, but temperature and light have the most effect. Butler (1966) reported that the organochlorine compounds are usually the most toxic, but are more harmful at summer than at winter temperatures.

A large percentage of the marine species with which we are concerned spawn during the warm or summer months, and consequently, poisons present would have their most severe effect on the newborn. Wilber (1962) stated that the disrupting effects of minute concentrations of certain toxicants in water on the normal embryological processes suggest that studies involving several generations of the test organism should be carried out.

In trying to evaluate the relationship between a poison and the physiological effect it produces there are two variables one must consider: 1. Concentration of the poison, and 2. Period of exposure. Lowe (1965) demonstrated the acute toxicity threshold of spot Leiostomus xanthurus to Endrin. An exposure level of .050 ppb (parts per billion) for eight months proved to be sublethal, but when increased to .075 ppb over fifty per cent mortality occurred in 19 days. When further increased to .100 ppb one hundred per cent mortality occurred in 5 days. Cairns et al (1967) accrued evidence that long term exposure to Dieldrin had had deleterious effects on reproductive success, at least at the .01 ppm concentration level.

Other studies have shown fish kills of spot to contain 6 ppm of DDT residue, while in other areas routine samples had residues as high as 13 ppm.

All of these data tend to indicate a wide degree of sensitivity even within a species, and only by specific species studies can we determine the effects of poisons. These studies should be conducted over a period of several years in order to evaluate the interaction of poisons and various environmental conditions.

Since the highest consistent residues encountered in these studies have been in speckled trout, this would be the logical species on which to commence investigations.

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