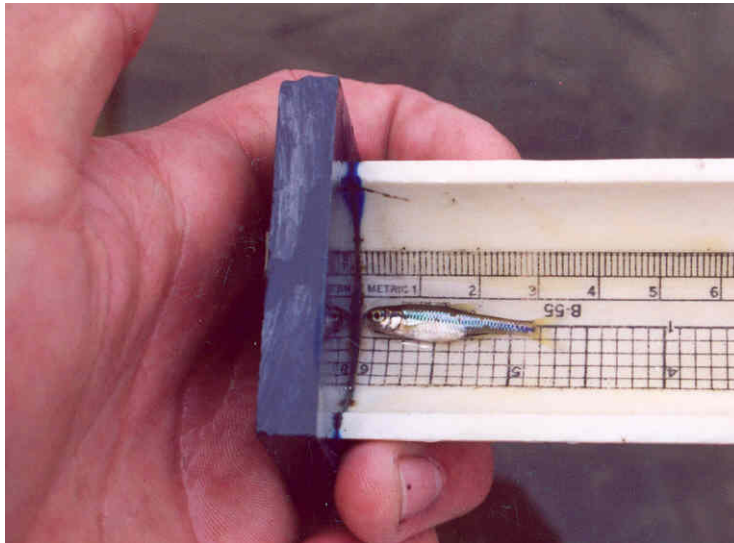




83 Ambrogio Dr, Suite K
Gurnee, IL 60030
8847-244-6662
847-244-0261 fax
www.lakesmanagement.com



Fish Assessment for Sanctuary Pond

October 10, 2005

Prepared For: Dr. Mike Sands
Executive Director
Liberty Prairie Foundation
847-548-4062X10
mikesands@prairiecrossing.com

Prepared By: Ms. Ingrid West
Mr. Christopher Ryan
83 Ambrogio Drive, Suite K
Gurnee, Illinois
www.lakesmanagement.com



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Gurnee, IL 60030
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Fish Assessment for Sanctuary Pond October 10, 2005

Introduction

Integrated Lakes Management staff completed a quantitative fisheries survey on September 8th to assess the relative abundance of fish in Sanctuary Pond. This was in addition to the sampling done earlier in the season on May 11th. Sanctuary Pond has been the rearing pond for a stocking project for several endangered and threatened fish species. The species that are in the pond include banded killifish, Iowa darters, blackchin and blacknose shiners and some incidental pugnose shiners that were inadvertently stocked. Over the years the fish have been consistently monitored and this study is a continuation of that monitoring program.

Methodology

- Thirty foot seine hauls were done in various locations around the pond these were done as ten and thirty foot pulls for a total of 6 seine pulls.
- A casting net was used for the open water areas of the pond. (This method was not as effective as hoped due to the thick coontail beds across the entire pond floor.)
- The general water quality conditions were assessed on September 21nd 2005.

Results

Total Collection/All Gear Types

		Total	%
Blackchin Shiner	Notropis heterodon	185	43
Blacknose Shiner	Notropis heterolepis	93	22
Banded Killifish	Fundulus diaphanus	151	35
Iowa Darter	Etheostoma exile	0	0
All fish collected		1,987	

ILM attempted to use several sampling strategies in order to collect a variety of species in Sanctuary Pond.

Sanctuary pond has a very healthy population of the three lotic fish populations; those being the banded killifish, and the blacknose and blackchin shiner. Every seine pull that was made had such large quantities of these fish that only sub-samples of each species were measured. The rest of the fish were mass counted and a percent of the total population is inferred.

There was good distribution of sizes in the fish collected. Tiny fish were observed but were not identified to species and many escaped through the net mesh. The fact that young of the year were observed and collected shows that there is adequate reproduction. All the fish collected were in excellent condition and some appeared to be currently spawning. In comparing the May and September data there is definite annual recruitment to each of the three populations. We also saw the population size and condition factor increase for all three species. This indicates that these populations are doing well.

However, due to the soft nature of the substrate and the abundance of vegetation it was very hard to effectively collect the Iowa darter. We do know that Iowa darters are present in the pond since several were collected during three separate collections earlier in the year. The first collection was for our study the second was for the University of Illinois at Chicago for their genetic variability study and the third collection where Iowa darters were collected was for the Brookfield Zoo stocking project. Unfortunately even during these collections few individuals were collected. It is not known if the lack of numbers is due to the inability to effectively collect this bottom species in a pond that is so heavily vegetated or if the population numbers are few due to habitat unsuitability. Further investigation specific for Iowa darters is warranted to make an accurate determination.

The primary predator in the pond is the frog population, principally the bullfrogs. Another predator for the minnows are the predaceous diving beetles and other macro-invertebrates that are piscivores. These along with birds are the only known predation mortality to these fish.

Recommendations:

- Continue to monitor the populations of all species in order to verify population stability. Use multiple sampling strategies to diversify catch, especially to sample the Iowa Darter.
- Consider monitoring the bullfrog population to determine if this population is growing. Since bullfrogs are a nuisance species it will be up to the Homeowner Association to determine whether they wish to treat this species similar to the way sparrows are monitored as a pest for bluebird nesting boxes.
- Plant management options needs to be considered in conjunction with the habitat requirements of new native species that are appropriate for this pond.
 - Encourage removal of excessive coontail, Eurasian water milfoil, and possibly planting other native submergent plant species in order to compete with these two nuisance plants. Coontail is not considered as beneficial as other native plant species. Coontail grows into extensive dense weed beds and does not contribute as positive a water quality benefit to the water column as other native plants.
- Another important monitoring consideration. Earlier in the season Eurasian water milfoil weevils were noted in the pond. It may be important to monitor the weevil population and predation on these weevils by the minnow species. Since we are promoting a fish population that is not balanced by predation these fish could be a primary predator on the weevils.

**Sanctuary Pond
Water Chemistry Data
September 21, 2005**

Air Temp 80 Degrees

Precipitation 0.3" (within 2 previous days)

Total Depth	Site 1	Site 2
Secchi Depth	4'	4'10"
pH	8.5	
Alkalinity	103	
Chloride	180	
IEPA color chart	13	13
Total Depth	7'2"	7'9"

Water Chemistry at Deep hole

Depth	Site 1				Site 2			
	Temp	Cond	DO	PH	Temp	Cond	DO	PH
Surface	21.7	823	6.0	8.6	21.6	786	9.3	9.4
1	21.7	826	5.6	8.6	21.9	782	9.5	9.5
2	21.6	826	5.6	8.6	20.9	785	7.8	9.4
3	21.2	823	5.4	8.6	20.4	788	7.2	9.4
4	20.7	820	4.4	8.6	20.0	795	2.9	9.2
5	20.4	850	1.5	8.2	19.6	818	1.2	8.7
6	20.0	1020	0.7	7.5	19.1	981	0.5	7.9
7	19.3	1147	0.4	6.9	18.6	1150	0.4	7.3
Bottom								

**Blackchin Shiner Age/Length Data (Becker) Compared
May and September Frequency Distribution.**

Blackchin shiner Age/Length Data (Becker)

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond % Total
0 M	25-35	39	38%
0 S		7	17%
I M	37-53	54	53%
I S		25	61%
II M	48-62	9	9%
II S		7	17%
III M	61-67	0	NA
III S		2	5%

Becker collection was done in August

Blacknose Shiner Age/Length Data (Becker)

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond %
0 M	27-35	0	0%
0 S		0	0%
M	35-45	21	77%
S		6	15%
1 M	45-55	4	14%
1 S		14	34%
M	56-70	2	7%
S		21	51%

Banded Killifish Age/Length Data (Becker)

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond %
0 M	25-40	44	50%
0 S		4	10%
I M	45-65	29	33%
I S		32	78%
II M	60-69	14	16%
II S		4	10%
III M	70	1	<1%
III S		1	2%

Becker collections were done in August

Fish Assessment for Sanctuary Pond

September, 2005

Black Chin		Blacknose		Killifish	
#	CM	#	CM	#	CM
1	2.10	1	5.50	1	6.30
2	3.30	2	4.80	2	5.00
3	5.10	3	4.50	3	5.40
4	3.80	4	5.80	4	4.30
5	3.80	5	5.40	5	6.00
6	4.60	6	6.20	6	4.30
7	4.20	7	5.30	7	4.40
8	3.10	8	5.90	8	4.00
9	4.50	9	5.10	9	5.00
10	3.60	10	4.00	10	5.00
11	3.00	11	5.20	11	3.70
12	3.00	12	5.40	12	4.10
13	3.80	13	5.00	13	4.20
14	3.10	14	4.30	14	4.50
15	3.80	15	5.00	15	4.70
16	2.60	16	4.60	16	3.60
17	3.20	17	5.20	17	4.60
18	2.90	18	4.50	18	4.10
19	4.10	19	4.30	19	4.70
20	3.60	20	5.20	20	4.30
21	3.20	21	6.30	21	4.30
22	3.70	22	5.20	22	4.50
23	3.50	23	4.50	23	5.00
24	3.70	24	3.80	24	5.90
25	3.30	25	5.60	25	4.70
26	3.90	26	4.30	26	4.90
27	3.50	27	4.50	27	4.70
28	4.80	28	3.70	28	4.60
29	4.00	29	4.00	29	4.70
30	3.70	30	5.50	30	5.70
31	3.00	31	6.10	31	5.00
32	3.10	32	3.70	32	4.80
33	4.80	33	4.80	33	4.90
34	4.50	34	6.30	34	4.70
35	5.10	35	3.90	35	4.30
36	3.90	36	5.00	36	4.60
37	3.10	37	5.80	37	4.60
38	3.00	38	5.30	38	4.80
39	3.40	39	4.90	39	4.80
40	3.80	40	5.10	40	3.90
41	3.50	41	6.20	41	5.00

185		93		151		Total # fish sampled 1,987
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INTEGRATED LAKES MANAGEMENT

Blackchin Shiner Frequency Distribution For September 2005

Fish Collection Form

23-Sep-05

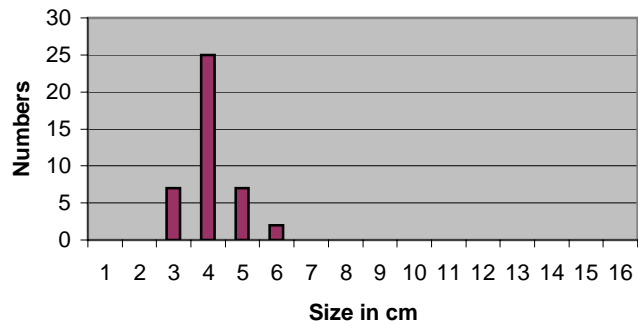
10:00 AM

Crew: I. West
C. Ryan

Locality: Prairie Crossing
Site Name Sanctuary Pond

Seine

Blackchin Shiner Length Frequencies



Mean	3.65122
Standard Error	0.104247
Median	3.6
Mode	3.8
Standard Deviation	0.667504
Sample Variance	0.445561
Kurtosis	0.102619
Skewness	0.366458
Range	3
Minimum	2.1
Maximum	5.1
Sum	149.7
Count	41

INTEGRATED LAKES MANAGEMENT

Blacknose Shiner Frequency Distribution For September 2005

Fish Collection Form

Dates: 23-Sep-05

Crew: I. West

Locality:

Prairie Crossing

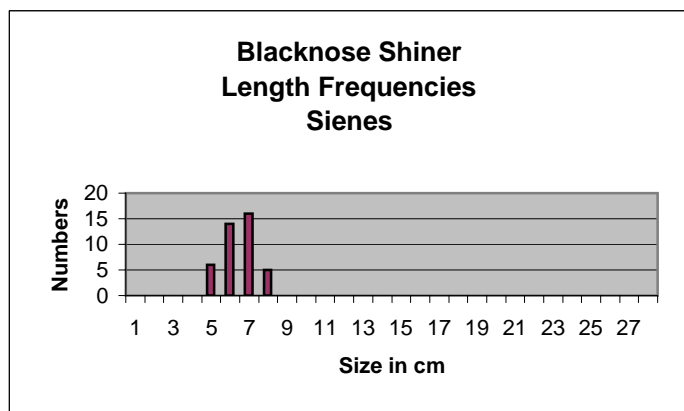
Time: 10:00 AM

C. Ryan

Site Name:

Sanctuary Pond

Gear: Seine



Mean	5.017073171
Standard Error	0.115394469
Median	5.1
Mode	4.5
Standard Deviation	0.738885119
Sample Variance	0.54595122
Kurtosis	-0.765682002
Skewness	-0.036859042
Range	2.6
Minimum	3.7
Maximum	6.3
Sum	205.7
Count	41

INTEGRATED LAKES MANAGEMENT

Banded Killifish Frequency Distribution For September 2005

Fish Collection Form

Dates: 23-Sep-05

Crew: I. West

Locality: Prairie Crossing

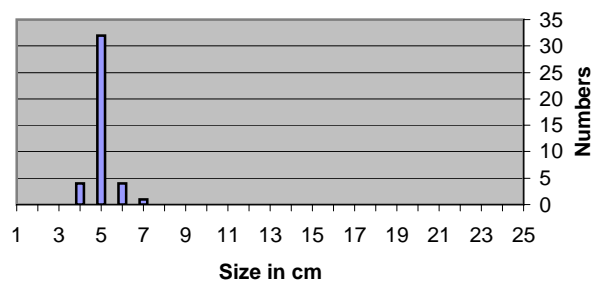
Time: 10:00 AM

C. Ryan

Site Name Sanctuary Pond

Gear: Seine

Banded Killifish Length Frequencies



Mean	4.697561
Standard Error	0.089544
Median	4.7
Mode	5
Standard Deviation	0.573362
Sample Variance	0.328744
Kurtosis	1.170381
Skewness	0.771247
Range	2.7
Minimum	3.6
Maximum	6.3
Sum	192.6
Count	41

INTEGRATED LAKES MANAGEMENT

Iowa Darter Frequency Distribution For September 2005

Fish Collection Form

Dates: 23-Sep-05

Time: 10:00 AM

Crew: Chris Ryan

Ingrid West

Locality: Prairie Crossing

Site Name Sanctuary Pond

Gear: seine

none

Field Notes for Fish Collection for Sanctuary Pond for May 11th, 2005.

ILM staff members included Sandy Kubillus, Jim Bland, and Pat Bland. Three seine hauls were made using a 20 ft. X 6ft. common sense seine with ¼" hexagonal mesh. Seine hauls were done at the southwest corner of the pond which has historically been the locality for monitoring the fish populations. All seine hauls were done from 4.5 ft. depth to the shoreline which was inches deep. Fish are collected in the seine and then held in a 3 ft. diameter open wash tub in about 6 inches of water. A small aquarium net is used to move fish from the open wash tub to a measuring board. Efforts are made to try to randomize our selection of fish so that no size or species bias is involved in the subsample.

We encountered several individuals which appeared to have fin rot, parasites, and a sunken stomach. We kept these individuals for purposes of documenting potential pathologies associated with these different species.

Data on the collections was converted to length frequency curves. Half centimeter increments were used to define the length categories. The tables below compare length and age as described in Becker's Fishes of Wisconsin with the length /frequency categories obtained as part of our May 11th collections. Life history data compiled by Burr et.al. identify blackchin shiners (*Notropis heterodon*) and blacknose shiners (*Notropis heterolepis*) as having multiple spawning cycles across the season.

Blackchin Shiner Age/Length Data (Becker) Compared To May 11th Frequency Distribution.

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond %	
	25-35	39	38%	
I	37-53	54	53%	
II	48-62	9	9%	
III	61-67	0	NA	

Becker collection was done in August

The differences in size range and age group may be attributable to the time of year that the collections were undertaken.

Blacknose Shiner Age/Length Data (Becker) Compared to May 11th Collection

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond %	
0	27-35	0		
	35-45	21	77	
1	45-55	4	14	
	56-70	2	7	

Blacknose shiners are only known to have a two year life cycle. Multiple spawning events occur however across a season. The frequency distribution for both shiners may be a reflection of multiple spawning events across a season.

Banded Killifish Age/Length Data (Becker) Compared to May 11th Collection

Becker's Age Class	Size Range (mm)	Sanctuary Pond Frequency	Sanctuary Pond %	
0	25-40	44	50	
I	45-65	29	33	
II	60-69	14	16	
III	70	1	<1	

Becker collections were done in August

The size range doesn't compare well with data which occurs in Becker. ILM suggests that a series be collected for purposes of aging the population. Collections done in August would probably be most suitable. Morphological characters suitable for aging need to be determined for each species.

ILM encountered a single Banded killifish female that was clearly pregnant. Thus spawning in May is quite likely.

We collected a single male Iowa darter that appeared to display spawning coloration. The darter was 56 mm in size. It had a sunken stomach that was suggestive of intestinal parasites. The specimen was kept for future examination.

Fish Assessment at Sanctuary Pond

May 11th 2005

Species #	Banded killifish Size: cm	Blackchin shiner Size: cm	Blacknose shiner Size: cm	Pugnose shiner Size: cm	Iowa darter Size: cm
1	3.9	4.5	3.7		5.6
2	5.7	4.7	3.2		
3	5.7	4	3.2		
4	4.7	3.2	3.2		
5	2.7	3.2	3.1		
6	3.2	2.2	3.3		
7	3.4	2.5	4		
8	4.7	2.5	4		
9	4.5	3	4		
10	4.3	3.5	3.5		
11	3.9	4.2	4.1		
12	3.2	2.8	3.6		
13	3	3	3.2		
14	3.6	2.7	4		
15	3.5	3	4		
16	3	3	3.8		
17	3	2.7	3.5		
18	3	3	5.5		
19	6.5	3.2	6.7		
20	5.5	3.2	4		
21	3.3	2.7	5		
22	4.3	3	4.5		
23	3.2	2.3	3.7		
24	3.4	4.6	3.5		
25	4	5	4		
26	4.1	3.2	6.5		
27	2.5	4.6	3.3		
28	2.7	2.8			
29	3.2	2.8			
30	6	2.5			
31	5.3	5.4			
32	5.5	4.5			
33	5	3.7			
34	3.9	3			
35	7	2.7			
36	6.5	3.2			
37	5.5	3.3			
38	3.4	3			
39	6	3			
40	5	2.6			
41	6	2.7			
42	5.9	2.9			
43	6	3.1			
44	5	3.1			
45	2.5	3.7			
46	6.5	4.5			
47	5.1	4.2			
48	3.5	2.7			
49	6	2.3			
50	3.8	2.3			
51	6	2.7			
52	3	5			
53	6.1	3.5			
54	5	3.5			
55	3.1	3.2			
56	5.5	2.5			
57	4	2.2			
58	3.5	4.2			
59	3.5	3			
60	3.2	2.7			
61	5.5	3.1			
62	6.5	4			
63	4.5	3.5			
64	3.8	3.4			
65	2.7	2.5			
66	3.3	3.6			
67	2.7	4			
68	4.2	3			
69	4.3	2.5			
70	3.2	3.2			
71	3.7	4.7			
72	3.1	3.5			
73	2.8	3.2			
74	3.7	5			
75	3.2	3.3			
76	3.2	4			
77	3.7	4			
78	3.4	4.2			
79	2.7	4.3			
80		3.2			
81		3.5			
82		3.7			
83		3.2			
84		3.9			
85		4.1			
86		3.5			
87		2.5			
88		3.5			
89		3			
90		3.6			
91		4.3			
92		4			
93		4.4			
94		4			
95		3.5			
96		3.5			
97		2.5			
98		4.9			
99		3.5			
100		3.9			
101		3.4			
102		2.7			
Count	79	102	27	0	1
Avg.	4.23	3.40	4.00	0.00	5.60

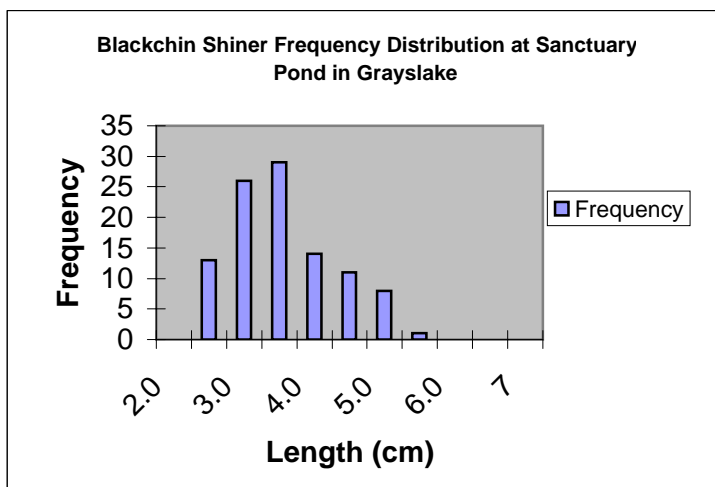
INTEGRATED LAKES MANAGEMENT
Blackchin Shiner Frequency Distribution For May 2005
Fish Collection Form

Dates: 11-May-05
Time: 10:00 AM

Crew: Pat Bland
 Jim Bland
 Sandy Kubillus

Prairie Crossing
 Sanctuary Pond

Gear: seine



Mean	3.394059
Standard Error	0.072968
Median	3.2
Mode	3
Standard Deviation	0.733324
Sample Variance	0.537764
Kurtosis	-0.28459
Skewness	0.601749
Range	3.2
Minimum	2.2
Maximum	5.4
Sum	342.8
Count	101
Confidence Level(9	0.144767

INTEGRATED LAKES MANAGEMENT

Blacknose Shiner Frequency Distribution For May 2005

Fish Collection Form

Dates: 11-May-05
Time: 10:00 AM

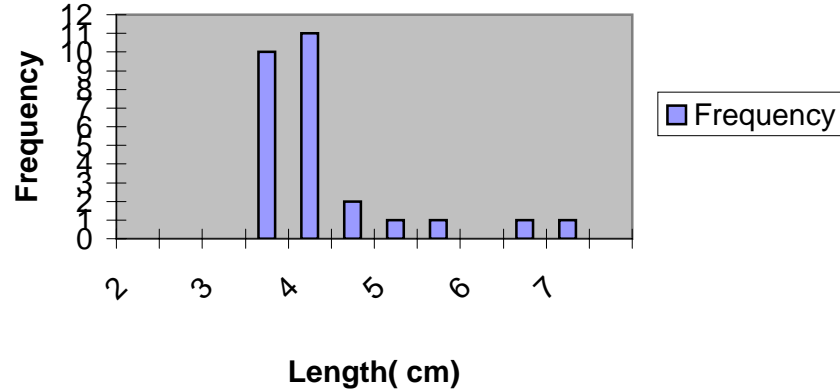
Crew: Pat Bland
Jim Bland
Sandy Kubillus

Locality: Prairie Crossing
Site Name Sanctuary Pond

Gear: seine

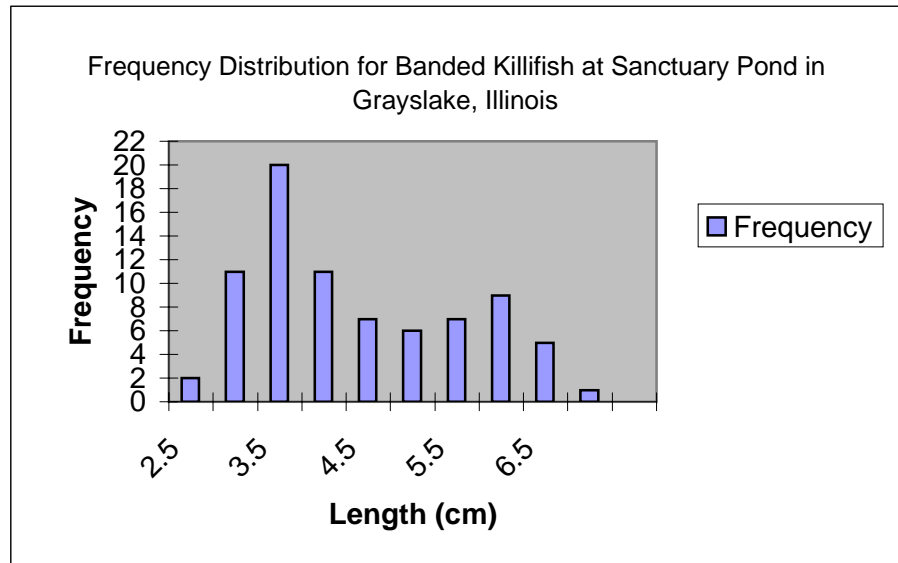
Mean	4.01538462
Standard Error	0.18577839
Median	3.9
Mode	4
Standard Deviation	0.94728763
Sample Variance	0.89735385
Kurtosis	2.86707497
Skewness	1.77586923
Range	3.6
Minimum	3.1
Maximum	6.7
Sum	104.4
Count	26
Confidence Level(95)	0.38261748

Frequency Distribution for Blacknose Shiners at
Sanctuary Pond in Grayslake Illinois



INTEGRATED LAKES MANAGEMENT
Banded Killi Frequency Distribution For May 2005
 Fish Collection Form

Dates: 11-May-05	Crew: Pat Bland	Locality: Prairie Crossing
Time: 10:00 AM	Jim Bland	Site Name: Sanctuary Pond
	Sandy Kubillus	
Gear: seine		



Mean	4.234615
Standard Error	0.139892
Median	3.85
Mode	3.2
Standard Deviation	1.235495
Sample Variance	1.526449
Kurtosis	-1.03215
Skewness	0.515293
Range	4.5
Minimum	2.5
Maximum	7
Sum	330.3
Count	78
Confidence Level(95.0%)	0.278561
