



The University of Arizona

College of Agriculture
School of Renewable Natural Resources
325 Biological Sciences East Building
Tucson, Arizona 85721

RECEIVED	
Organ Pipe Cactus, N. M.	
MAY 8 '85	
1985	
A Proud Beginning	
ACTION	FILE
ADMIN. SERV.	
EXT. AFFAIRS	
RESOURCE MGMT.	
CH. MAINTENANCE	
INTERV. SPECIALIST	
PARK SERVICE	
PARK TECH.	
SPWA	
ED	
FILE	

2 May 1985

Mr. Bill Mikus, Resource Manager
Organ Pipe Cactus National Monument
USDI National Park Service
Route 1, Box 100
Ajo, Arizona 85321

Dear Bill:

Enclosed is a copy of the pupfish capture data we collected on 4-24. Figure 1 shows the approximate placement of the traps, the total number a fish caught in each trap, and the total number of fish collected from certain general areas. In parentheses I've shown the average catch per trap (set for 2 hr) in certain areas. I used these values to help draw up a "suggested" trap placement (Figure 2). They may also be of comparative value in future years.

As I mentioned on the phone, I think the use of at least 40 traps is appropriate and a 2-day census should ensure a good picture of pupfish abundance and size distribution. If 40 (or more) traps set 3 times per day over 2 days doesn't result in a perceptible drop in catch rates, you'll know there is a very large population present. More likely, samples will be applicable to depletion estimation techniques. Such a high level of effort should also reveal the presence of any small introduced fishes.

I've also enclosed 2 pages of notes illustrating the general approach to depletion estimation techniques. Eventually I will provide you with the various mathematical gymnastics which can be applied to capture data to produce an estimate. It might be useful to attach this packet of information to the draft report "Monitoring Abundance...." I submitted earlier.

I enjoyed our field work last week and the chance to visit with you and Dick.

Sincerely,

Bill

William J. Matter
Associate Professor
Wildlife and Fisheries Science

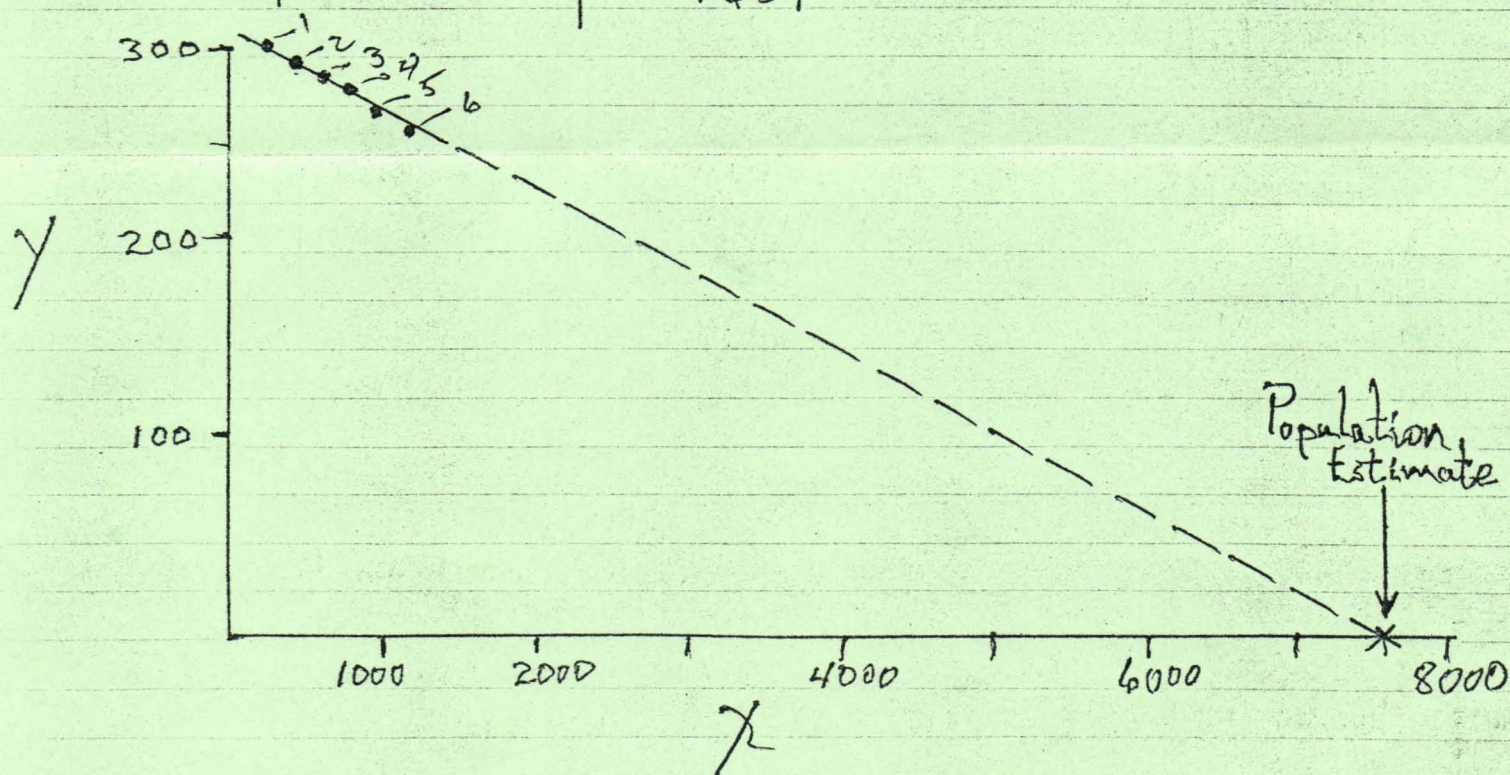
WJM/eba

CC: Peter Bennett

Data for Depletion Estimation - Example from Page 1

Depletion estimation is basically a plot of "catch-per-unit-effort" vs/ the sum of the accumulative catch. This plot is used to find the accumulative catch when $\text{Catch/Unit Effort} = 0$.

$Y = \text{Catch/Unit Effort}$	$X = \text{Accum. Catch}$
1- 300	300
2- 289	589
3- 278	867
4- 267	1134
5- 257	1391
6- 248	1639



An Example of Catches Required to Result in Population Depletion

If the Population = 8000 (relatively high for Quitovaquits?) and if sufficient effort is applied to capture about 300 individuals in the early rounds (we got close to that on 4-25-85 with 29 traps)

Then, we should be able to catch about the same proportion of the fish remaining with each effort we apply.

* an effort = 29 traps set for 2 hr (or any such #'s)

* for illustrative purposes the "fixed proportion" is $= \frac{300}{8000} = 0.0375$

<u>Effort or Run No.</u>	<u>Proportion Caught</u>	<u>Population Available for Capture</u>	<u>Hypothetical Catch Per Unit Effort</u>	
1	0.0375	x 8000	= 300	} This is the degree of depletion which ought to occur.
2	"	x 7700	= 289	
3	"	x 7411	= 278	
4	"	x 7133	= 267	
5	"	x 6866	= 257	
6	"	x 6609	= 248	

Possible Outcomes:

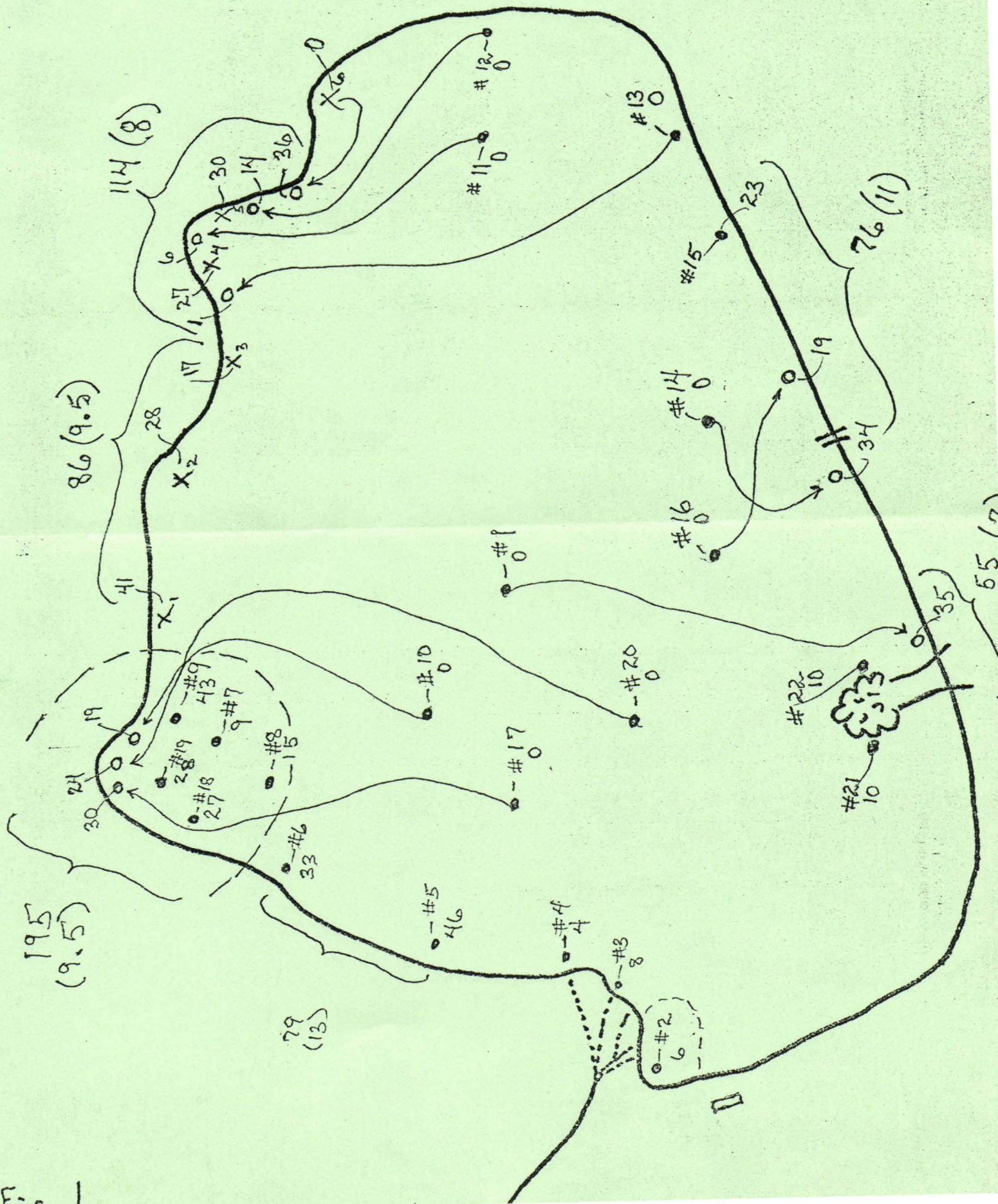
1. If our census generates a similar depletion, the estimation technique will predict a pop. of about 8000.
2. If our census generates a more rapid depletion, we will get an estimate of less than 8000.
3. If we capture about 300 fish each run but don't get a depletion, then we can be pretty sure the population is larger than 8000 (We know for sure the population is > 1800 , since $6 \text{ Runs} \times 300 = 1800$). If the population is that large, it's fine.

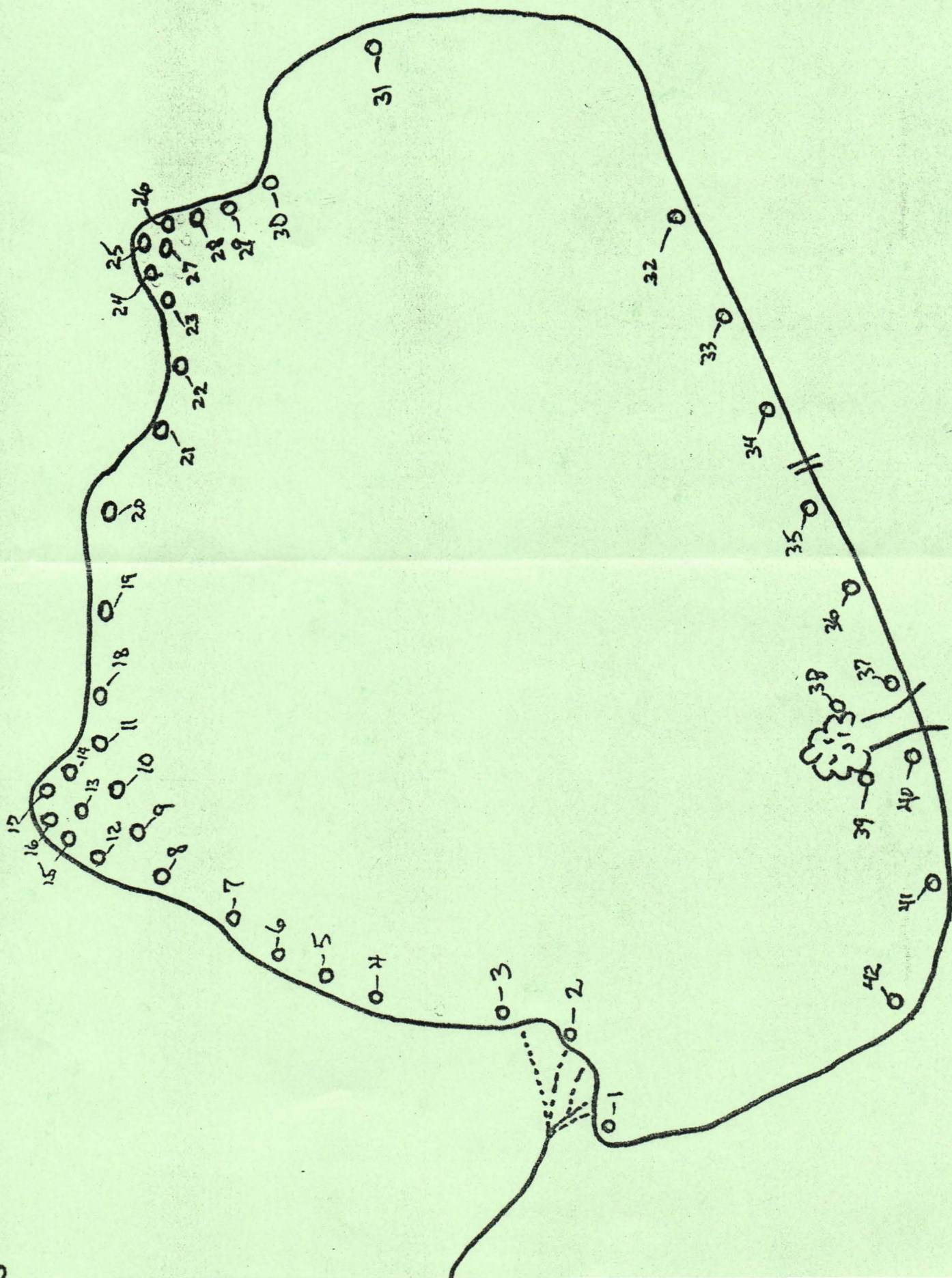
Quitovaquito Pond Pupfish Census 4/25/85

Procedure: 28 screened minnow traps were set in the pond according to the placement shown in Figure 1. Nets were set for 2 hr and then lifted from the water; all pupfish were counted and transferred to an insulated cooler, and traps were returned to the pond. Several traps that caught no fish were relocated after Run 1. The new placements are shown on Figure 1 as open circles.

RUN 1	RUN 2	RUN 3
Start 9:53 End 10:30 am Temp. 24°C Pick Up 11:50	Start 11:50 am End Temp. 24.5°C Pick Up 1:50 pm	Start 1:50 pm End Temp. 26°C Pick Up 3:55 pm
2 3 3 3 4 0 5 1 6 5 7 0 8 5 9 7 10 2 11 5 12 0 13 0 14 0 15 6 16 10 17 0 18 0 19 0 20 0 21 0 22 0 23 0 24 0 25 0 26 0 27 0 28 0	2 2 3 4 4 22 5 7 6 2 7 4 8 3 9 16 10 19 11 11 12 16 13 3 14 2 15 0 16 9 17 12 18 10 19 8 20 6 21 11 22 33 23 4 24 13 25 0 26 12 27 9 28 11	1 5 2 0 3 23 4 27 5 7 6 6 7 9 8 4 9 8 10 14 11 21 12 2 13 0 14 26 15 17 16 14 17 8 18 3 19 19 20 3 21 2 22 1 23 1 24 22 25 7 26 8
Tot. 96	277	257

* = Moved to a new location





7-26-85

RECEIVED		
U.S. Fish & Wildlife Service		
SEP 30 1985		
ACTION INFO		NOTED
☒	SCHMIDTKE, J.	☒
	MANNING	
	CR. RANGER	
☒	RESERVE MGMT.	☒ cr
	CR. MANAGER	
	INTL. SEC.	

pupfish census data
ement of 32 traps
communication (5/2/85).
te of population
lustrated in Ricker
sed.) The 2 day

Enclosed are two copies (one for Bill Mikus) of the pupfish census data collected on 5/23-24/85. The first figure shows the placement of 32 traps and follows the general pattern I suggested in an earlier communication (5/2/85). I have shown the calculations necessary to get an estimate of population size according to a regression technique described and illustrated in Ricker (1975) - (a copy of the instructions from Ricker is enclosed). The 2-day effort (3 trappings per day) with 32 traps resulted in a very slight and quite irregular drop in catch-per-unit-effort. Thus, the population estimate (8900 fish) is not very precise. In fact, I have had some trouble calculating meaningful confidence limits, due in part I think, to the shallow and irregular "depletion" we actually achieved. The positive side of this situation is that it is a consequence of the large number of fish available for capture. We captured and held almost 2000 fish and yet catch rates declined little, indicative of a very large population relative to the total catch. The mark-recapture technique used previously at Quitobaquito also yields an increasingly more imprecise estimate as the actual population size increases, so the problem is not unique to the "depletion technique". I'm sure that the use of more traps would yield a more precise estimate at this high population level, but such precision may not be required once you know the population is around 9000 fish (higher than any of the estimates by Kynard).

I strongly recommend that you consider using a depletion census for future population monitoring at Quitobaquito because:

- I would also recommend that:

1. the number of available traps be increased to 45 to 50 (the ease of operation will ensure that this is not a burden),
2. two-day removal efforts with three, 2 to 2½-hour sets per day be continued at least once per year,

3. length data from a subsample of captured pupfish (at least 250-300) continue to be taken in order to follow the age-class make up of the population and to construct a data base for future comparison,
4. at least two floating holding cages be acquired for retention of fish during depletion sampling, and
5. a computer program for estimation of population size and confidence intervals for that estimate be developed, possibly according to the outline given by White, G. C., D. R. Anderson, K. P. Burnham, and D. L. Otis. 1982. Capture-recapture and removal methods for sampling closed populations. Report No. LA-8787-NERP. Los Alamos National Laboratory, Los Alamos, New Mexico.

or

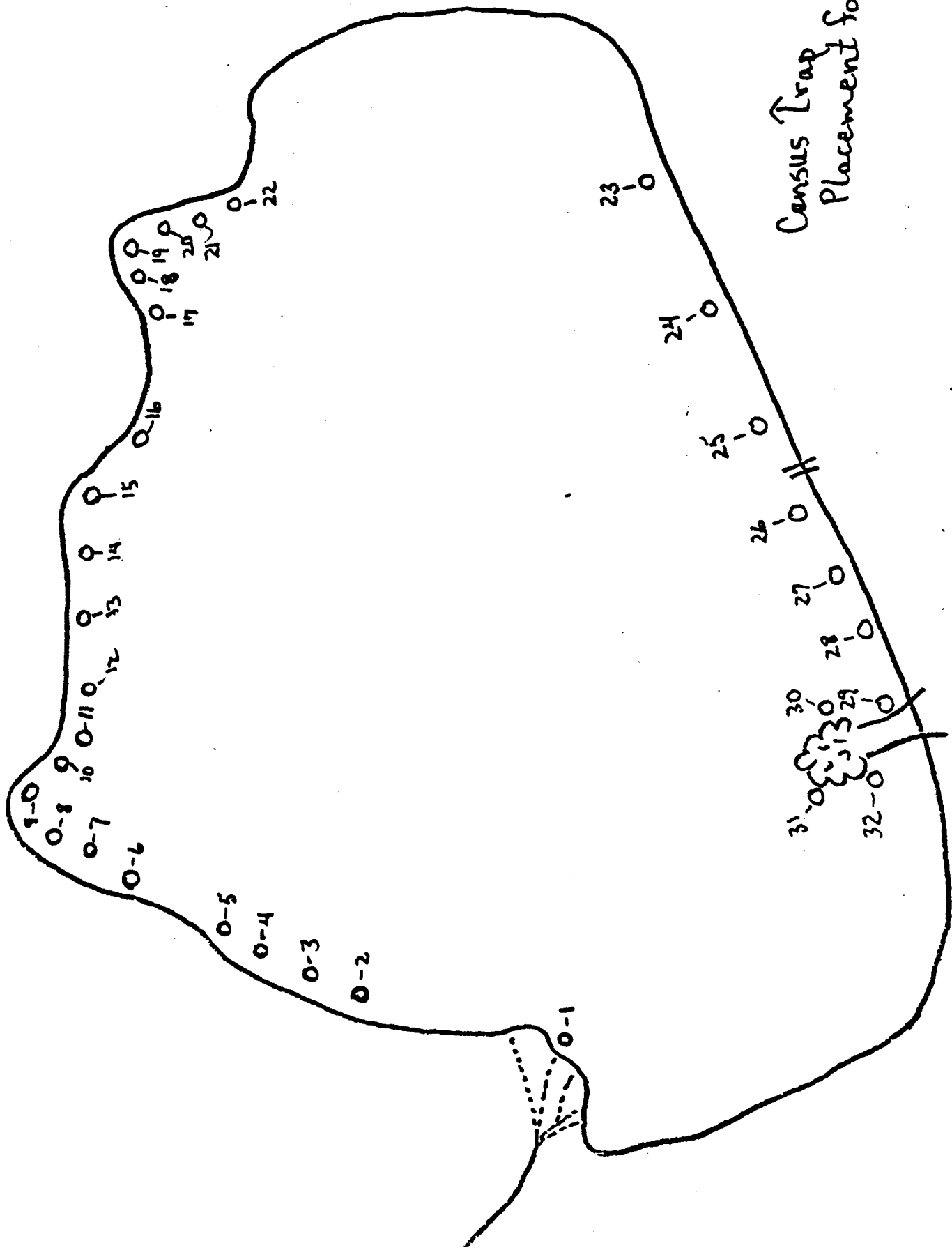
Otis et al. 1978. Statistical inference from capture data on closed populations. Wildlife Monographs 62: 1-135.

I want to assure you that I will be available to meet with you or Park personnel in order to fill in any detail which may be required to implement those recommendations you feel have merit or to generate additional recommendations.

Sincerely,

Bill 9-26-85

William J. Matter
Associate Professor
Wildlife and Fisheries Science



Census Trap
Placement for 5/23-24/85

5-23-85
5-24-85

Run 1
set: 10:45^{am}
out: 12:45^{pm}

R-2
set: 12:45
out: 2:40^{pm}

R-3
set: 2:40
out: 4:40

R-4
set: 9:55^{am}
out: 11:55

R-5
12:00
2:00^{pm}

R-6
2:05
4:05

TRAP No.

1	5	2	6	2	47	14
2	8	2	29	2	60	42
3	4	8	1	11	4	18
4	8	3	4	12	9	14
5	26	10	0	5	2	1
6	8	22	12	54	22	20
7	2	5	4	11	0	1
8	10	14	6	9	23	4
9	14	1	1	9	11	9
10	4	26	3	3	7	2
11	5	2	22	7	0	2
12	4	8	9	4	10	4
13	34	5	3	24	3	8
14	30	4	16	15	22	16
15	4	7	1	8	26	11
16	12	79	0	39	0	9
17	13	0	7	0	1	3
18	3	1	0	1	19	18
19	1	22	33	2	5	13
20	4	4	16	4	0	1
21	1	7	0	14	28	3
22	7	18	0	1	12	0
23	22	32	5	9	17	12
24	21	5	1	8	7	10
25	49	15	2	10	4	3
26	15	1	5	9	16	0
27	8	4	12	4	17	5
28	4	10	1	0	15	1
29	13	1	0	6	0	2
30	4	23	1	2	1	2
31	19	9	4	0	0	1
32	3	5	1	5	9	2

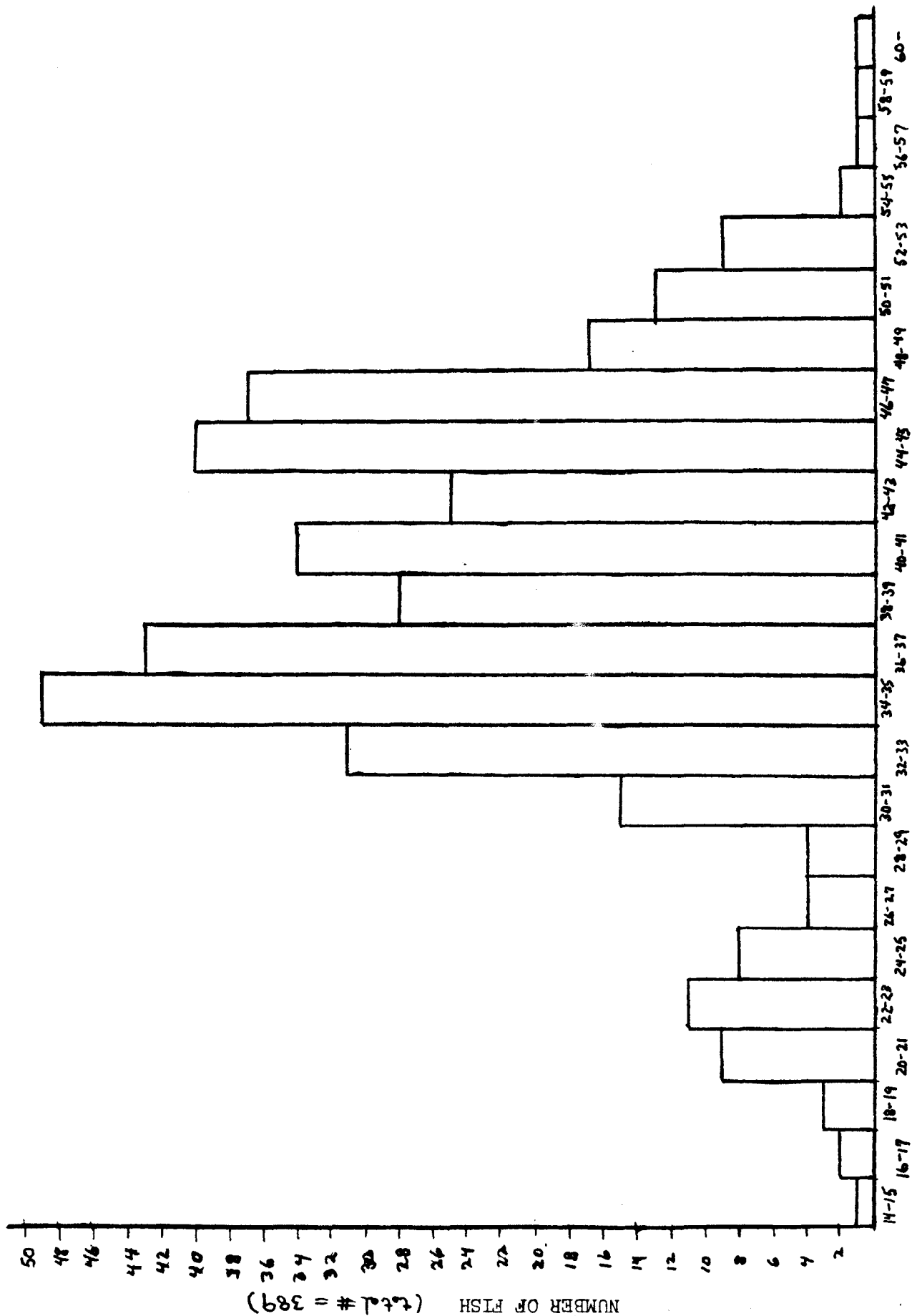
TOTAL 365 375 202 290 397 251 1000

Puffin Census 881
5/23-24/85

	Morning (Runs 1 & 4)	Noon (Runs 2 & 5)	Afternoon (Runs 3 & 6)	TOTAL
<u>TOTAL Length (mm)</u>				
14	0	1	0	1
17	0	2	0	2
18	0	0	2	2
19	0	1	0	1
20	0	2	3	5
21	0	3	1	4
22	1	3	3	7
23	1	1	2	4
24	0	0	2	2
25	0	3	3	6
26	0	2	1	3
27	1	0	0	1
28	0	1	2	3
29	0	0	1	1
30	1	2	4	7
31	3	2	3	8
32	6	4	7	17
33	2	9	3	14
34	6	10	10	26
35	2	10	11	23
36	7	4	10	21
37	6	7	9	22
38	1	6	7	14
39	2	7	5	14
40	4	8	15	27
41	6	4	7	17
42	5	6	2	13
43	4	1	7	12
44	4	7	5	16
45	6	8	10	24
46	4	4	7	15
47	6	8	8	22
48	4	7	4	15

Pyfish Census
892

				TOTAL
49	3	1	3	7
50	3	3	3	9
51	2	1	1	4
52	2	2	2	6
53	0	1	2	3
54	0	0	0	0
55	1	1	1	3
56	0	1	0	1
57	0	0	0	0
58	0	0	0	0
59	1	0	0	1
60	0	0	1	1



TOTAL LENGTH (MM)

Population Estimate - Leslie's Method from Ricker (1975)
pgs. 150-153.

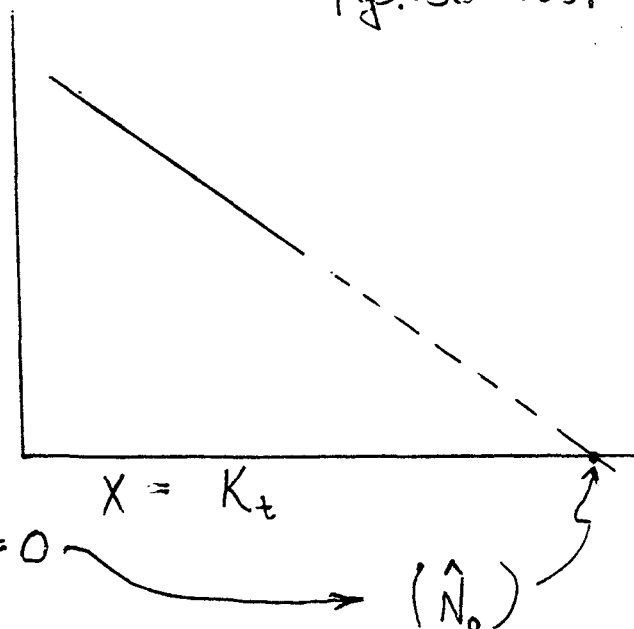
(1) $\frac{C_t}{f} = q N_0 - q K_t$

where:

(2) $\frac{C_t}{f}$ = Catch per unit effort

(3) q = catchability = slope of C_t/f on K_t
= b

(4) N_0 = Original Population
= the $X = K_t$ when $Y = C_t/f = 0$
= (Y-axis intercept) / slope
= a/b } from $Y = bX + a$, where
 $Y = C_t/f$ & $X = K_t$



K_t = the sum of the catch to the start of time = t , plus one-half of the catch during interval t .

For the Quitovaquito Pupfish data - 5/23-24/85:

Effort No. =	1	2	3	4	5	6
$C_t/f = Y =$	365	375	202	290	397	251
$K_t = X =$	182.5	552.5	841	1097	1430	1754

Calculations:

$$(1) \sum X = 5847$$

$$(2) \sum X^2 = 7348828.5$$

$$(3) \sum x^2 = \frac{\sum (X^2) - (\sum X)^2}{n} \\ = 1,650,927$$

$$(4) \sum Y = 1880$$

$$(5) \sum Y^2 = 619,364$$

$$(6) \sum y^2 = \frac{\sum (Y^2) - (\sum Y)^2}{n} \\ = 30,297.3$$

$$(7) \sum (XY) = 1,766,876$$

$$(8) \sum xy = \frac{\sum (XY) - (\sum X)(\sum Y)}{n} \\ = -65184$$

$$(9) \text{ slope } = b = \frac{\sum xy}{\sum x^2} \\ = -0.0395$$

$$(10) \text{ variance of points from the regression line} = S_{y \cdot x}^2 \\ = 6930.6$$

$$(11) \text{ variance of } b = S_b^2 \\ = 0.0042$$

$$(12) Y\text{-axis intercept} = a \\ = \frac{\sum Y - b \sum X}{n} \\ = 351.8$$

$$(13) \hat{N}_0 = \frac{a}{b} = \frac{351.8}{-0.0395} = \underline{\underline{-8907}}$$

FIRST DAY - CLEAR, LIGHT WINDS

MIKU
L2000

8 HRS. TRAP

11-04-72

START 0845 PICK UP	1st TRAP (16.2) 1045	2nd (19.0) 1245	3RD 20.0 1445	4th 19.0 1645	5TH	TOTAL
1	0	0	0	0		1
2	0	0	0	0		1
3	1	0	0	1		2
4	0	0	0	0		1
5	2	0	0	1		3
6	0	1	0	0		1
7	0	0	0	0		1
8	0	1	0	0		1
9	1	1	8	7		17
10	0	0	1	0		1
11	0	0	0	1		1
12	0	0	0	0		1
13	0	1	1	1		3
14	0	0	0	0		1
15	0	0	0	1		1
16	0	0	2	0		2
17	0	2	0	0		2
18	0	2	0	10		12
19	0	1	13	39		53
20	0	1	0	0		1
TOTAL	4	8	25	61	33	98

1115 2 MALPES CIRCLE Pond M ^{MIKUS} 28 - QUITOBAQUTO
 1420 1 BOBCAT 3 Foot From Cos. M - QUI TOBAQUITO
 BEING CHASED BY SMALL BORDO. PICNIC TABLES
 COLLIE & DICK YELLOW DOG

2000
MIKU
L2000

BILL MIXUS - CLEAR LITTLE OR NO WIND
MAY LOCAN WATER TEMP. 14°C
AIR TEMP. 14°C

1ST TRAPPING
MARKABLE

11-04-88

SUB MARKABLE

1ST TRAPPING MARKABLE	SUB MARKABLE
I (1)	(11) (3)
-2ND TRAPPING- HHH (5)	HHH (3)
-3RD TRAPPING- HHHHHHHHH (20)	HHH (5)
-4TH TRAPPING- 40 ~~HHH~~ ~~HHH~~ ~~HHH~~ ~~HHH~~ ~~HHH~~ ~~HHH~~ ~~HHH~~ ~~HHH~~ (HHH) II (52)	~~HHH~~ ~~HHH~~ (9)

MORTALITY - 1M SUBM

SECOND DAY

BILL MILKUS

CLEAR LIGHT WINDS

MAP LOCARI

10-05-82

	1ST	2ND	3RD	4TH	TOTAL
START	1400 0845				
	1600 1045	1900 1245	2100 1445	2100 1645	
1	0	0	0	0	0
2	0	1	0	2	3
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	2	1	3
6	3	2	10	11	26
7	0	0	0	0	0
8	0	0	0	0	0
9	2	1	3	2	8
10	0	0	0	1	1
11	0	0	0	0	0
12	0	0	0	0	0
13	0	0	0	1	1
14	0	0	0	2	2
15	1	0	0	2	5
16	0	0	0	0	0
17	0	1	0	0	1
18	0	2	4	1	7
19	0	2	1	0	3
20	0	0	1	0	1
TOTAL	6	11	21	23	61

1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20

22
 21
 11
 6
 60

SECOND DAY

MARKED	UNMARKED 1 ST TRAPPING	SUB MARKABLE
	///	I
⑤	④	①
→	2 ND	←
⑥	/// III ⑧	/// ③
→	3 RD	←
⑦	/// /// /// II ⑫	/// ④
→	4 TH	→
⑧	/// /// /// /// I ⑮	II ②
	30	16



United States Department of the Interior

NATIONAL PARK SERVICE

ORGAN PIPE CACTUS NATIONAL MONUMENT

~~PO BOX 100, AJO, ARIZONA 85321~~

Route 1, Box 100, Ajo, AZ 85321

IN REPLY REFER TO:

N2219

March 18, 1981

Memorandum

To: Files

WA 3/18/81

From: Resource Management Specialist, ORPI

Subject: Spring 1981 Population Estimate, Pupfish

The first spring pupfish (pre-breeding) population estimate was conducted on Tuesday, March 17, 1981. It is not intended to provide as detailed information as the Peterson-Mark recapture of the fall months. Instead, it is hoped that, by duplicating this procedure in future years, trends can be identified and/or major problems such as the golden shiner introduction detected early.

Procedure: Ten traps were placed at locations shown on the accompanying map. They were set near the surface with the top of the trap not lower than 2 or 3 inches below the surface, and vegetation was cleared away from the entrances. Ends of traps were aligned parallel to the bank. Traps were set at 1100 hours and not disturbed for 4 hours and then checked and emptied at 1500 hours. The fish in each trap were counted and returned to the water immediately, exactly where trapped, to minimize disturbance to any breeding activity that might be under way. Fish were estimated in two size categories only.

Prevailing conditions: Sky condition--mostly clear, few high thin scattered clouds--calm. Maximum free air temperature at visitor center 79°F. Minimum 43°F. Water Temperature--(taken approximately 10 feet from shore at surface in center of circle of traps at northeast corner of pond)--74°F (22°C).

Note: Original intent was to trap as soon as surface water temperature reached 20°C; but trapping was delayed due to unavoidable circumstances. Surface water temperature this year first reached 20°C about February 27th. Colder weather followed, however, and water temperature was no doubt depressed until nearly the date of the trapping. Future spring censuses should commence when surface water temperature first reaches 20°C and stays there.

Results: Four hundred twenty-five fish were trapped during the 4-hour period. This represents 10.6 fish/per trap/hour.

★ Year of
the
Visitor

Fish < 22mm. length = 14
Fish > 22mm. length = 411

Total 425

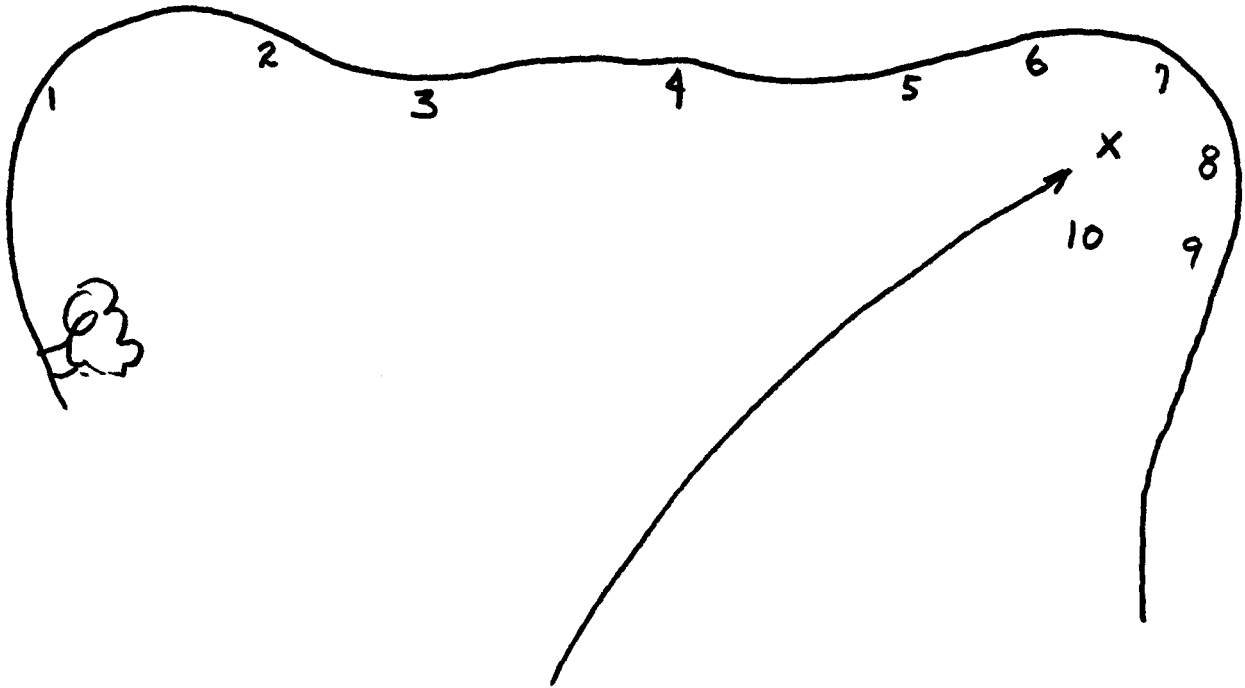
General observations: Fish were vigorous and appeared healthy. No obvious problems were noted. Males were in full breeding color.



James T. Peters

map attached

North



Temperature Taken @ This location

		< 22mm	> 22m
Trap #	1 =	1	26
	2 =	0	0
	3 =	0	57
	4 =	1	30
	5 =	2	35
	6 =	5	57
	7 =	2	78
	8 =	0	32
	9 =	3	94
	10 =	0	2
		14	411

10/14/81

TOTAL

	1	2	3	4	
1	0	0	0	0	0
2	0	0	0	2	2
3	0	2	3	1	7
4	0	1	0	0	1
5	5	2	0	0	7
6	3	12	11	0	26
7	1	1	1	0	3
8	3	2	1	0	6
9	0	0	1	1	2
10	6	0	0	0	0
11	2	2	0	0	4
12	2	0	0	0	2
13	0	0	0	0	0
14	0	0	1	0	1
15	2	1	5	0	8
16	1	0	0	0	3
17	1	0	0	1	2
18	1	1	3	1	6
19	2	0	0	3	5
20	0	0	0	0	0
21	21	3	9	4	37

Oct 14 & 15, 1981

Reppish Survey of ~~10/14/15/81~~

	Unmarked	Marked	Submarkable	Grand Total
1 st Trap	~~37~~	~~37~~	24	
2 nd Trap		22	7	
3 rd Trap		35	5	
4 th Trap		<u>14</u>	<u>1</u>	
Total		108	37	145

1 st Recapture	2	18	8	
2 nd Recapture	0	8	2	
3 rd Recapture	0	17	2	
4 th Recapture	<u>4</u>	<u>28</u>	<u>10</u>	
Total	6	77	22	105

$$\hat{N} = \frac{MC}{R}$$

$\hat{N}$ = est. of pop. size

M = no. marked & released

C = recapture sample size

R = no. marked recaptured

also figure % submark in
recapture pop; $\frac{22}{105} \times \hat{N}$ and
add to $\hat{N}$ = pop est.

$$\frac{108 \times 83}{6} = 1494$$

$$\text{Submark} = 105 \sqrt{22} = 51\%$$

$$\frac{1494}{.21} = 313.7 = 314$$

pop est = 1808 fish

FIRST TRAP

FALL 1981

RIGHT FIN CLIP.

10-14-80

START TRAP
0900

PICKUP
1100

STARTING
TEMP. 20°C

11:30 End Temp 21°C

		IMPERIAL	SUBMITTAL	
1	0			
2	0			
3	1			
4	0			
5	5			
6	3			
7	1			
8	3			
9	0			
10	0			
11	2			
12	2			
13	0			
14	0			
15	2			
16	1			
17	1			
18	1			
19	2			
20	0			
21	2			
22	0			
23	0			
24	0			
25	0			
26	0			
27	0			
28	0			
29	0			
30	0			
31	0			
32	0			
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36	0			
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68	0			
69	0			
70	0			
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78	0			
79	0			
80	0			
81	0			
82	0			
83	0			
84	0			
85	0			
86	0			
87	0			
88	0			
89	0			
90	0			
91	0			
92	0			
93	0			
94	0			
95	0			
96	0			
97	0			
98	0			
99	0			
100	0			

① 61

② 39

③ 40

④ 15

Total 145

18.1 fish/hr trapped
8)145
8
65
64
1

21-22

45 ESTIMATE

BUTTER

WE NEED SMALL NETS CHECK TO SEE IF WE
HAVE ANY XTRA PEPS (WATERPROOF) ONION SKIN

Second Trap

10/14/81

Start
1100

Pickup
1300

Starting
Temp 21°C

1330 End Temp 21°C

Trap	Markable	Submarkable
1 - 0	<del> </del> <del> </del> <del> </del> <del> </del>	<del> </del>
2 - 0		
3 - 2	22	7
4 - 1		
5 - 2		
6 - 12		
7 - 1		
8 - 2		
9 - 0		
10 - 0	20	
11 - 2		
12 - 0		
13 - 0		
14 - 0		
15 - 1		
16 - 2		
17 - 0		
18 - 1		
19 - 0		
20 - 0	6	
21 - 3	3	
	29	

22
7

29

Third Trapping

10/14/81

Start
1300

Pickups
1500

Starting
Temp

21°C
End 20°C

Traps

1 - 0

2 - 0

3 - 3

4 - 0

5 - 0

6 - 11

7 - 1

8 - 1

9 - 1

10 - 0 12

11 - 0

12 - 0

13 - 0

14 - 1

15 - 5

16 - 0

17 - 0

18 - 3

19 - 0

20 - 0 2

21 - 9 26
35

Markable

|||||

||||

35

Submarkable

||||

5

35

40

Fourth Trapping

10/14/81

Start
1500

Pickup
1700

Starting
Temp 25°C
 $^{\circ}\text{C}$

Traps

1 - 0

2 - 2

3 - 1

4 - 0

5 - 0

6 - 0

7 - 0

8 - 0

9 - 1

10 - 0 - 4

11 - 0

12 - 0

13 - 0

14 - 0

15 - 0

16 - 0

17 - 1

18 - 1

19 - 3

20 - 0 - 5

21 4 - 9

Markable	Submarkable
/// ~~///~~ ///	1
14	1
	15

14
1
15

First Recapture

28
10
19
57

10/15/81

Start
0900

Pickup
1100

Starting
Temp 20°C

Trap	Marked	Unmarked	Submark	
1 0	11	<del> </del> <del> </del> <del> </del>	<del> </del>	
2 1				
3 0	2	18	8	18
4 0				2
5 0				8
6 2				<u>28</u>
7 1				
8 1				
9 0				
10 0 <u>5</u>				
11 0				
12 0				
13 0				
14 0				
15 1				
16 2				
17 1				
18 2				
19 0				
20 0 <u>6</u>				
21 15 <u>11</u>				<u>26</u>

Second Recapture

10/15/81

Start
1100

Pickup
1300

Starting
Temp 20°C

1300 - 21.5°C

Trap

Marked	Unmarked	Submark
	~~11~~ 11	11
	8	2
		$\frac{7}{10}$

1-2

2-0

3-0

4-0

5-0

6-1

7-0

8-6

9-0

10-0 2

11-0

12-0

13-0

14-0

15-0

16-0

17-0

18-2

19-0

20-0

21-0

7

Third Recapture

10/15/81

Start
1300

Pickup
1500

Starting
1515 Temp 21°C

Trap

1 - 0

2 - 0

3 - 0

4 - 1

5 - 2

6 - 3

7 - 2

8 - 4

9 - 4

10 - 0 16

11 - 0

12 - 0

13 - 1

14 - 0

15 - 1

16 - 0

17 - 0

18 - 1

19 - 0

20 - 0 3 14

21 - 0

Marked	Unmarked	Submark
	<del> </del>	
	<u>17</u>	<u>2</u>
		19

17
2
19

Fourth Recapture

10/15/81

Start
1500

Pickup 1600
1700

Starting
1700 Temp 21°C

Traps

1-0

2-0

3-1

4-0

5-0

6-4

7-0

8-10

9-3

10-3 21

11-1

12-0

13-0

14-0

15-0

16-1

17-0

18-0

19-0

20-0 2

21-15

23
15
38

Marked	Unmarked	Submark.
-		
4	28	10

4
28
10
42

42
19
10
28
99

10-14-80

Fall 1980 pupfish
censusCapture

Logan/Peters

TRAP #	1	2	3	4	TOTAL		
1	0	15	1	15	31		
2	17	18	0	0	35	1st TRAPPING	2:30 Hrs
3	2	2	0	0	4	2nd	" 2:15 Hrs
4	4	0	10	0	14	3rd	" 1:15 Hrs
5	14	9	1	0	24	4th	" 1:00 Hrs
6	37	5	2	13	57		8:00
7	31	10	5	0	46		
8	12	12	1	1	26		
9	20	4	5	0	29		
10	4	0	29	1	34		
11	40	1	2	0	43		
12	15	1	1	0	17		
13	0	X	23	0	23		
14	X	9	0	0	9		
15	3	1	8	0	12		
16	0	12	0	0	12		
17	2	1	0	0	3		
18	27	6	1	4	38		
19	21	9	9	0	39		
20	0	0	1	0	1		
21	3	5	5	0	13		

510 ESTIMATED NUMBER
FISH TRAPPED494 NUMBER FISH COUNTED
MARKABLE & SUBMARKABLE

302 MARKED & RELEASED

POP FISH

10-14-80

START 1030AM

1ST TRAPPING

TRAP 1100 - PICK UP 1300

==

~~2-3~~ TEMP

SET # 4 FISH

	MARKABLE	SUBMARKABLE
+1-0		
+2-17		
+3-02		
+4-04		
+5-14		
+6-37 ⁽³⁷⁾		62
+7-31		
+8-12		
+9-20	152	152
+10-04		62
+11-40 ⁽¹⁰⁴⁾		214
+12-15		
+13-0		
+14-X		
+15-3		
+16-0 ⁽⁶³⁾		
+17-02		
+18-27		
+19-21		
+20-0		
+21-03		

152
86
42
22
302

WRITE CHECK LIST.

10-14-80

3rd TRAPPING

START 1525
FINISH 1545

PICKUP 1630

TEMP @ 1700 - 24C

MARKABLE

SUB MARKABLE

1 + 1

2 + 0

3 + 0

4 + 10

5 + 1

6 + 2

7 + 5

8 + 1

9 + 5

10 + 29

11 + 2

12 + 0

13 + 23

14 + 0

15 + 8

16 + 0

17 + 0

18 + 1

19 + 9

20 + 1

21 + 5

109

|||||

|||||

42

|||||

|||||

|||||

62

91
- 18
73

10-14-80

4th TRAPPING

START 1630

PICKUP 1730

FINISH 1700

1 + 15
2 + 0
3 + 0
4 + 0
5 + 0
6 + 13
7 + 0
8 + 1
9 + 0
10 + 1
11 + 0
12 + 0
13 + 0
14 + 0
15 + 0
16 + 0
17 + 0
18 + 4
19 + 0
20 + 0
21 + 0

MARKABLE

||||| ||

22

SUBMARKABLE

|||||

15

28
- 12

16

①

10/17/80

RECAPTURE

START 1030

FIRST PICK UP 1310

FIRST 10 TRAPS IN @ 1040

2ND 10 TRAPS IN @ 1046

TEMP 57°F = 1046

ALL 20 TRAPS IN @ 1105*

TEMP 72°F = 1400

- 1+1 MARKED	UNMARKED	SUB MARKS	
- 2 + 1 <del> </del>	<del> </del> <del> </del> <del> </del> <del> </del>	<del> </del> <del> </del> <del> </del> <del> </del>	START TRAP 1105
- 3 +	<del> </del> <del> </del> <del> </del> <del> </del>		PICK UP 1310
- 4 + 2 17	<del> </del> <del> </del> <del> </del> <del> </del>	25	1400 = 72°F
- 5 + 15 ~~22~~	<del> </del> <del> </del> <del> </del> <del> </del>		
- 6 + 10	<del> </del> <del> </del> <del> </del>		
- 7 + 20			
- 8 - 15	118		
- 9 +		17	
- 10 + 0 45		118	
- 11 +	2.05	25	
- 12 + 1	2.35	160	
- 13 + 10	1.05		
+ 14 + 25	6.45	1310	
- 15 + 26		1105	
- 16 + 20		2.05	
- 17 + 3	17 118		
- 18 + 13	10 71		
- 19 + 25	8 54	25	
- 20 - 0 61	35 243	44	
	4 35	17	
	278	86	SUB MARK
	MARKED IN		

139 22
25 45
16 26
61
154

②

10/17/80 RECAPTURE

2ND START 1310

2ND PICKUP 1545

TEMP 70°F 1615

	MARKED	UNMARKED	SUB MARK
1 X			
2 X			
3 + 11	10		
4 X			44
5 + 15			
6 + 15			
7 + 1			
8 + 3			
9 + 6			
10 + 0		71	10

11 + 30
12 + 1
13 + 1
14 + 30
15 X 62
16 + 21
17 + 1
18 + 40
19 + 12
20 - 1 13

26
25
62
93
206

10
71
44
125
160
285
79
364

1545
1310
2135 mi

10/17/80

3RD TRAP

RECAPTURE

START 1545

PICKUP 1650
TEMP 70°F 1710

	MARKED	UNMARKED	SUBMARKED
① +5			
② +0			
③ +0			
④ +1			
⑤ +0	8		
⑥ +0	6	54	17
⑦ +2			
⑧ +0			
⑨ +0			
⑩ +0			
⑪ +0	2		
⑫ +13			
⑬ -1			
⑭ +1			
⑮ +20			
⑯ +4	39		
⑰ +9			
⑱ +0			
⑲ +9			
⑳ +15			
㉑ +0	33		

1650
1545
105

54
17
71

6
2
39
33
80



United States Department of the Interior

NATIONAL PARK SERVICE

ORGAN PIPE CACTUS NATIONAL MONUMENT

~~XXXXXX XX XX XX XX XX XX XX XX~~

Route 1, Box 100, Ajo, AZ 85321

IN REPLY REFER TO:

N2219

November 7, 1980

Memorandum

To: Files

From: Resources Management Specialist, ORPI

Subject: Fall Pupfish Survey, 1980

The fall pupfish population census was started October 14, 1980. Good weather prevailed with highs in the 70's and 80's and lows varying from 61°F at the start to 44°F at the end of the recapture phase. Water temperature ten feet from shore was 21°C and 20°C respectively for the capture and recapture operations.

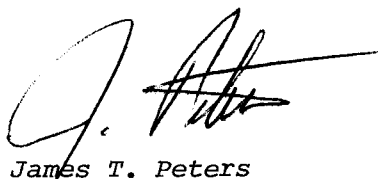
Max Logan, VIP, again assisted in the census. October trap locations (similar to those listed in Kynard's Technical Report #1) were used, except that those traps which consistently produced no fish were moved to more productive sites in order to obtain the minimum sample size in one day to prevent having to hold the fish overnight with possible mortality.

A problem with the traps was identified and corrected. The wire screening did not fit properly and was probably allowing the smaller fish to escape. Obviously, this occurrence will affect the results of the past three surveys. It was not corrected until after the 1980 census.

A capture of 3.0 fish/trap/hour indicates a considerable increase from prior years in spite of the fact that the population estimate suggests a slightly reduced population. This discrepancy must be resolved before the Peterson-Mark recapture system can be replaced by a substitute fish/trap/hour system.

During the survey an extra trap was placed in the east spring (the spring nearest the V-notch weir), and pupfish were located. This fact is only noted because the question of whether fish were present in the springs was raised recently by U.S. Fish and Wildlife endangered species coordinator Jerry Burton during an on-site visit to resolve the critical habitat issue. The disjunct population is obviously small due to the very limited water present in the tule-choked spring. This population was not included in the population census, and Kynard does not refer to it in his reports.

Census results are attached.



James T. Peters

Enclosure



QUITOBAQUITO PUFFISH SURVEY

October 14, 1980, CAPTURE

October 17, 1980, RECAPTURE

TRAPPING

Markable	152	Submarkable	62	Total	302
	86		43		<u>182</u>
	42		62		
	<u>22</u>		<u>15</u>		484
	302		182		

RECAPTURE

Marked: 35 Unmarked: 178 Submarkable: 86

$$\hat{N} = \frac{MC}{R} \quad \text{Where...}$$

$\hat{N}$ = estimate of population size
M = number of fish marked and released
C = recapture sample size
R = number of marked fish recaptured

$$N = \frac{302 \cdot 278}{35} = 2,399 \quad (\text{markable population only})$$

% of population which is submarkable: $278 \sqrt{\frac{.31}{86.0}}$ or 31%

$$\begin{array}{r} 2,399 \\ .31 \\ \hline 743.7 \end{array} \quad \begin{array}{r} 2,399 \\ +744 \\ \hline 3,143 \end{array} \quad \text{Total Population}$$

FISH/TRAP/HOUR (Determined from original trapping sequence only, not recapture)

484 fish
8 hours trapping
20 traps used

$$8 \sqrt{\frac{60.5}{484}} \text{ fish/hour}$$

$$20 \sqrt{\frac{3.0}{60.5}} \text{ fish/trap/hour}$$



IN REPLY REFER TO:
N-2219

United States Department of the Interior

NATIONAL PARK SERVICE
ORGAN PIPE CACTUS NATIONAL MONUMENT
~~XXXXXX XXXX ARIZONA XXXX~~
Route 1, Box 100, Ajo, AZ 85321

November 20, 1979

MEMORANDUM

TO: Files
Through: Chief Ranger and Superintendent

FROM: Resources Management Specialist

SUBJECT: Annual Pupfish Population Survey

The annual pupfish census was started on October 3, 1979. The weather was favorable for trapping, reaching daytime highs of approximately 103° and lows around 68°. The temperature of the water approximately 10 feet from shore was recorded at 21°C. 306 fish were obtained, marked, and released by 1200 hours on 10/4/79.

Max Logan and Julie Schultz, both VIPs aided in conducting the survey. The October trap locations diagram was used to determine trap sites. It was found that the most successful traps were located along the north bank, in shallow water quite close to shore with both ends of the trap clear of vegetation.

*See collection of
notes between #100
hr. & pupfish survey*
A capture of .89 fish/trap/hour as compared to .77 fish/trap/hour for last year indicates the fish were slightly more active than last year. It is important that we standardize trapping techniques from year to year so that we can eventually arrive at a population estimate using only the number of fish trapped per hour rather than the entire Peterson mark-recapture system.

In computing the results it is important to remember that the submarkable fish are not counted as part of the retrapping sample size (C). Instead, the percentage of submarkables taken in the recapture sample is added to the population estimate to make up the total population estimate.

One question not yet resolved is whether the recapture of marked plus unmarked but markable sized fish must equal or exceed 300 individuals in order to make up a valid sample or if the total recapture sample (including submarkables) must equal or exceed 300 individuals.

The ratio of submarkables to markable fish was obtained using the recapture sample only.

The disjunct population discovered on the west side of the pond at the overflow last year has disappeared. The overflow area was dry at the time of the survey, probably due to reduced spring flow/rainfall this year.

For census results see attachments.

A handwritten signature in cursive script, appearing to read 'J. Peters', written in dark ink.

James T. Peters

QUINOBAQUITO PUFFISH SURVEY

October 1979

TRAPPING

Markable:	70	Submarkable:	31
	80		50
	115		42
	6		4
	35		15
	<u>306</u>		<u>142</u>

RECAPTURE

Marked: 25 Unmarked: 178 Submarkable: 112

$$\hat{N} = \frac{MC}{R}$$

$\hat{N}$ = estimate of population size

M = no. fish marked and released

C = recapture sample size

R = no. marked fish recaptured

$$N = \frac{306 \cdot 203}{25} = 2485 \text{ markable population only}$$

$$\% \text{ of population which is submarkable: } 315 \sqrt{\frac{.36}{112}}$$

$$\begin{array}{r} 2485 \\ .36 \\ \hline 894.60 \end{array}$$

$$\begin{array}{r} 2485 \\ 895 \\ \hline \boxed{3380} \end{array} \text{ POPULATION ESTIMATE}$$

FISH/TRAP/HOUR

448 fish caught total

25 total hours of trapping

20 traps

$$25 \sqrt{\frac{17.9 \text{ fish/hour}}{448}}$$

$$20 \sqrt{\frac{.89 \text{ fish/trap/hour}}{17.9}}$$

CALCULATION OF CONFIDENCE INTERVAL FOR ESTIMATE

$$\frac{R}{C} = \frac{25}{203} = .12$$

Using the graph, P values placed at .07 and .17

$$R_1 = (C) \cdot .17 = 203 \times .17 = 34.51$$

$$R_2 = (C) \cdot .07 = 203 \times .07 = 14.21$$

$$\begin{aligned} \hat{N}_{95\%} &= \frac{MC}{R_1} \quad \text{to} \quad \frac{MC}{R_2} \\ &= \frac{306 \cdot 203}{34.51} \quad \text{to} \quad \frac{306 \cdot 203}{14.21} \\ &= \boxed{1800 \text{ to } 4371} \end{aligned}$$

PROCEDURE

1. Using the same values as were used to determine the population estimate, find R/C .
2. Locate this point on the X axis.
3. On the vertical above that point, locate the 2 points (one above the other) where the C value (curved line) intersects. For example, if $R/C = .2$ and $C = 250$ the curved lines will intersect .2 at .15 and .26.
4. Calculate the lower R (R_1) by multiplying .26(C) and the higher R (R_2) by multiplying .15(C).
5. Calculate the 95% confidence interval by using the formula:

$$\hat{N}_{95\%} = \frac{MC}{R_1} \quad \text{to} \quad \frac{MC}{R_2}$$

Oct 3, 1979

Pupfish Census

1010 = 70° water temp. ~10ft. out 21°C

T#	FISH	MARKABLE	SUBMARKABLE
1	-3		
2	-0		1
3	-11		
4	-0		31
5	-3	70	
6	-18		
7	-27		
8	-8		
9	-1		
10	-7		
11	-13		
12	-3		
13	-6		
14	-0		
15	-0		
16	-1		
17	-9		
18	-1		
19	-0		
20	-1		

64

10-3-79 SECOND TRAPPING @ 2:30 PM

	MARKABLE	SUB MARKABLE
1 - 25		
2 - 1		
3 - 0		
4 - 17		
5 - 25		
6 - 17		
7 - 0		
8 - 0		
9 - 1		
10 - 0		
11 - 7		
12 - 0		
13 - 4		
14 - 17		
15 - 0		
16 - 0		
17 - 6		
18 - 0		
19 - 0		
20 - 0		

80

50

10-4-79. 4TH TRAPPING @ 8:30 AM

		<u>MARKABLE</u>	<u>SUB MARKABLE</u>
1 - 15			
2 - 3	25	###	###
3 - 12	25	###	###
4 - 3	25	###	###
5 - 22	25	###	###
6 - 3	15	###	###
7 - 7			
8 - 1			
9 - 4			

10 - 30 EST.

11 - 3
 12 - 1
 13 - 2
 14 - 0
 15 - 0
 16 - 0
 17 - 2
 18 - 0
 19 - 0
 20 - 4

102

185
 115
 200

1/2

10-4-79 5 TRAPPING @ 10³⁰ AM

	MARKABLE	SUBMARKABLE
1 - 0		
2 - 0		
3 - 0		
4 - 1		
5 - 4		
6 - 0	12	
7 - 0	<u>6</u>	4
8 - 20	91	
9 - 0		
10 - 0		
11 - 0		
12 - 10		
13 - 1		
14 - 0		
15 - 0		
16 - 1		
17 - 4		
18 - 1		
19		
20 - 0		
20		

10-4-79 STOPPED TRAPPING 12:00 AM - NOW

TRAPPING #1	#2	#3	TOTAL	#4	SUB TOTAL	#5	10-4-79 TOTAL	#6
1 - 3 - 25 - 11 - 15			54		54	0	54	0
2 - 0 - 1 - 2 - 3			6		6	0	6	M1
3 - 11 - 0 - 0 - 12			22		22	0	22	S2
4 - 0 - 17 - 1 - 3			21		21	1	21	m1
5 - 3 - 25 - 3 - 22			53		53	4	57	0
6 - 18 - 17 - 4 - 3			42		42	0	42	0
7 - 22 - 0 - 12 - 7			36		36	0	36	0
8 - 8 - 0 - 1 - 1			10		10	0	10	0
9 - 1 - 1 - 0 - 4			6		6	0	6	0
10 - 1 - 0 - 2 - 30			33		33	0	33	1
11 - 13 - 7 - 3 - 3			26		26	0	26	0
12 - 3 - 0 - 2 - 1			7		7	0	7	0
13 - 6 - 4 - 0 - 2			12		12	1	12	0
14 - 0 - 17 - 1 - 0			18		18	0	18	0
15 - 0 - 0 - 0 - 0			0		0	0	0	0
16 - 1 - 0 - 0 - 0			1		1	1	1	0
17 - 9 - 6 - 5 - 2			22		22	4	26	M6
18 - 1 - 0 - 0 - 0			1		1	1	2	0
19 - 0 - 0 - 0 - 0			0		0	0	0	0
20 - 1 - 0 - 4 - 4			9		9	0	9	0

#1-2-3 (2) Two Hours EAGIT
16 Hours

#5 (2) Two Hours

#6 30 MINUTES

TRAPPING TERMINATED 10-4-79 12 NOON

166
130
34.30

10-3-79 THIRD TRAPPING @ 4³⁰

	MARKABLE	SUB MARKABLE
1 - 11		
2 - 1		
3 - 0		
4 - 1	35	15
5 - 3	80	
6 - 4	20	
7 - 12	185	
8 - 1		
9 - 0		
10 - 2		
11 - 3		
12 - 2		
13 - 0		
14 - 1		
15 - 0		
16 - 0		
17 - 5		
18 - 0		
19 - 0		
20 - 4		
	50	

10-5-79

RECAPTURE 11 AM

	MARKED	UNMARKED	SUB MARK	
1-				
2-				
3-				11 AM. To 1:00 PM
4-				
5-	(25)			
6-				
7-				
8-				1 PM To 3 PM
9-				
10-				
11-				
12-		1516		
13-		(178)	100 112 Not Counted	
14-				
15-				
16-				
17-				
18-				
19-				
20-				

178
+ 25

203

112
128
25

315 Total

10-5-79 RECOUNT STARTED TRAP^{11:00}
#1 TRAPPING

	marked CLIPPED	un marked NOT CLIPPED	SUB MAX
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

mark
 20
 80
 35
 115
 4
~~1106~~
 306
 142
449

5
 4
 3
 2

500 mg 1000 mg
 31
 50
 15
 42
 4
142

$$\begin{array}{r}
 1.29 \\
 255 \overline{) 300.0} \\
 \underline{255} \\
 550 \\
 \underline{510} \\
 400 \\
 \underline{390} \\
 10
 \end{array}$$

~ 1.29 fish/hr.

Oct
1979

Original trapping duration

Traps set @ 10:30 25.0 hrs.

Total fish	<u>448</u>
Subs.	<u>142</u>
marked	<u>306</u>

re capture

MARKED
25

UNMARKED
178

SUBMARKABLE
112



United States Department of the Interior

NATIONAL PARK SERVICE
ORGAN PIPE CACTUS NATIONAL MONUMENT
ROUTE 1, BOX 100
AJ0, ARIZONA 85321

IN REPLY REFER TO:

N-2219

November 17, 1978

Memorandum

To: Files *Joe*
Through: Chief Ranger and Superintendent *M*
From: Resources Management Specialist
Subject: Annual Pupfish Population Survey

The annual pupfish census was started Monday October 23, 1978. Live trapping to obtain the required sample for marking was hampered by unfavorable weather. In spite of unseasonably cool temperatures resulting from a cold front and an abnormal amount of rain the required 300 fish were obtained, marked and released by 1400 hrs. on 10/25/78. A warming trend was evident for recapture and reasonably good success was obtained over a 24 hr. period in spite of high water turbidity and depressed water temperatures.

Mr. Robert Garrett of Tucson, Dr. Kynard's assistant, helped on a volunteer basis since 1978 was the first year the census was conducted by Park staff. Trap locations suggested in Kynard's publication were not strictly adhered to because it was not possible to obtain the required minimum number of fish from those locations. (Presumably due to the colder water temperatures noted in 1978). The majority of the successful traps were concentrated along the north bank, close to shore and quite shallow. Traps set deeper and those few located away from shore did yield a few fish indicating some dispersal within the pond, but they were few in number.

One of the spare traps was set in the overflow area south of the pond during the recapture phase in an effort to determine if any fin-clipped fish would migrate to that area thus indicating a continuous population; none did. This should not be construed to suggest that there is no population flow between the two areas, but rather that none occurred during the short duration of the survey. This population was not noted by Kynard earlier and is thought to be recent. This population was not treated as part of the main pond ecosystem for sampling purposes and although it consists of a minimum of several hundred individuals it is not included and probably should not be in the future.

Low surface water temperatures of 14.50C and the fact that most of the fish were concentrated close to the north shore suggests they were no longer in their summer movement patterns. In future years every effort should be made to time the census so that it is made as late as possible in the year

(to guarantee a greater number of markable fish greater than 22 mm in length) but early enough that they are still in their summer movement patterns. Normally this time frame would be the 1st two weeks of October. The low capture of fish/per trap/hr. of .77 compared to Kynard's 18.6 fish/per trap/hr. indicates that they were not very active. In a post-census conversation he stated that spatial orientation or trap locations can be varied if necessary to capture the required sample. It is essential, however, to obtain at least 300 fish of markable size and to return a relative proportion of the marked fish to the same approximate locations from which they were obtained. For example, if 20% of the fish originally were trapped in the NE corner of the pond, then after fin clipping roughly that number should be returned to the NE corner prior to the recapture.

A few other additional suggestions are offered to help maintain continuity in future surveys. Traps are all numbered to minimize the chance of losing one in the pond. An aerator would be desirable especially if the original capture does not produce the 300 fish and those captured must be held overnight. When counting fish, sub-markables (those less than 22 mm in length) should be kept in a separate container. They are not counted as part of the re-capture sample.

For census results see attachments.

James T. Peters

Total 81163
61728 markables
11435 sub-markables
81163

10-24-78

0946

Released

300 @

1400

- 1 6-1 ~ 150
- 2 = 6 ~~more~~ 0-0-4
- 3 14-4-9-20
- 4 14-0-0-5
- 5 6-0-11
- 6 0-6-1-3 moved to N. Sdr
- 7 7-1-10
- 8 2- moved ^{N. of Cottonwood} to N. Sdr - 3
- 9 1-0-1
- 10 1-2-1
- 11 5-1-25
- 12 = 3-2-30
- 13 7-1-13-12
- 14 0-6-4 N. 9 bank (center of Road)
- 15 1-0-0-2 move to North
- 16 0-0-1-5
- 17 0-1-45 ^{N⁴⁰} North bank
- 18 0-0-20
- 19 3-8
- 20 4-0

21

22

23

24

25

Trap # 6

Recapture 10 - 26 - 78
1400

marked
IIII

9

IIII

14

unmarked

IIII 4 IIII

IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

210

IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

IIII IIII IIII IIII

300

Sub marked

IIII IIII IIII IIII

IIII IIII IIII IIII

29

IIII IIII

IIII IIII

1 50

210

29

9

248

trapped by 1300

350:14

116

additional trapped by 1400

248
116
364

155 @ pool

12345
678910

12345

12345

12345

12345

300
↓

marked

|||||

300
2

|||||

|||||

|||||

|||||

||

91

9

30
10-25.78

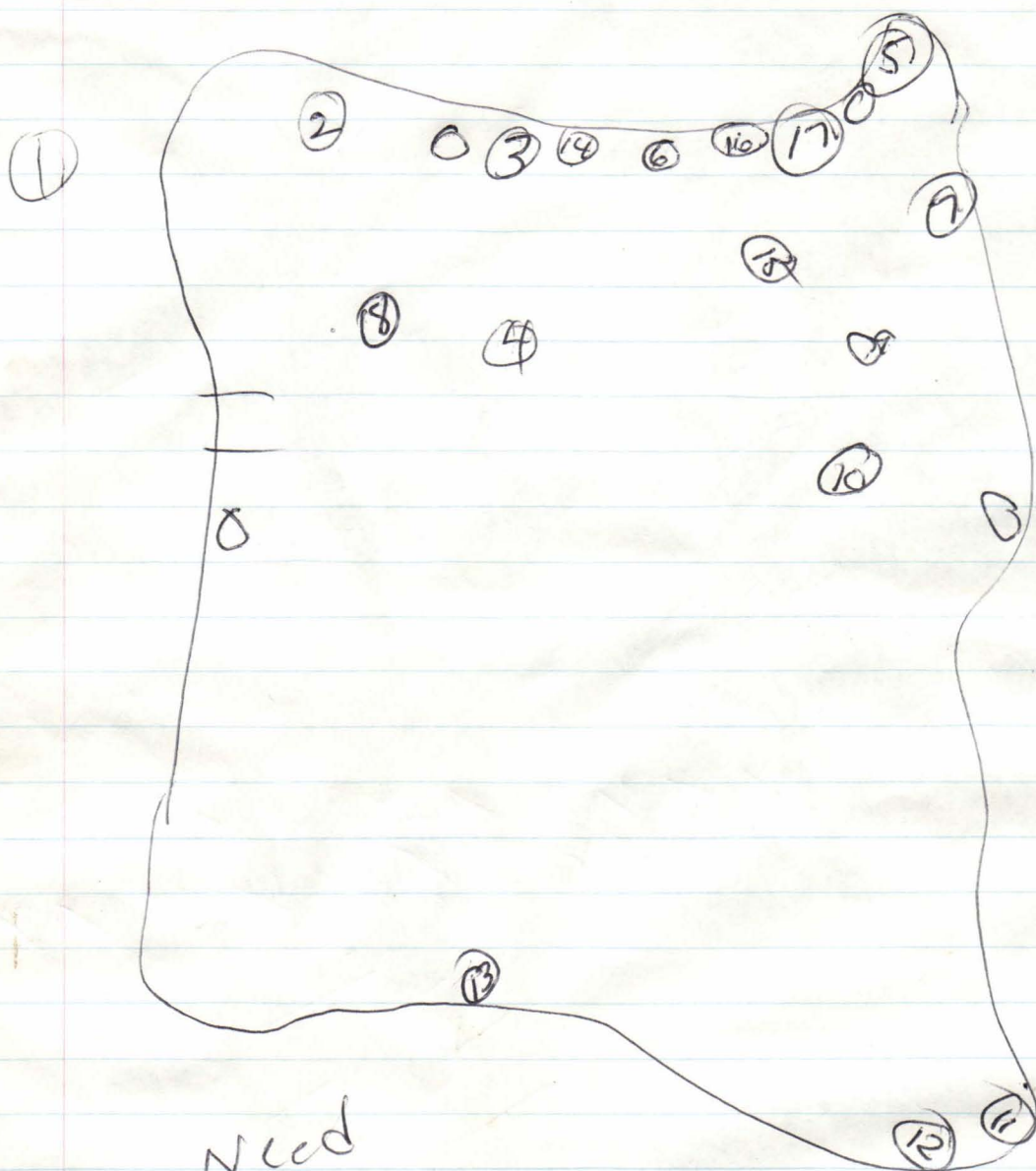
100

|||||

97

need 14

1978



Need

18
19
20

Summary of 10/23/78 census

10/23/78

Terry Peters + Robert Garrett (Kynard's assistant) conducted the trapping. This was the first time park staff were involved in the census effort.

- 1) traps placed at 0946 hrs.
- 2) fish were apparently gathered 4 times during the course of the day (as many as four columns show up on the original data sheets),
- 3) it is not apparent at which "gathering" event fish were taken. (e.g. time of day - some columns are missing!)
- 4) 546 fish were apparently taken (total of all columns) and 300 were marked and released by 1400 hrs. on 10/25/78, two days after the project was begun. Three days were apparently needed to acquire the minimum number of markable sized fish (300) due to cool weather.
- 5) The suggestions are made in Peter's memo of 11/17/78 (N-2219) to:
 - a) Trap sometime during the 1st 2 weeks of October before water temps. become too cool for active fish movement.
 - b) an aerator would be a good item to have in the event that markable sized fish need to be held over more than one day to obtain the minimum of 300 needed.
- 6) Trap locations, ^{+ spacial orientations} from Kynard's 1st tech. report were not adhered to. Traps were moved to areas, ^{+ depths} where maximum capture success could be had! [is this good for accurate pop. sampling?]
- 7) marked fish should be returned to the same area they were captured in (after the necessary 300 minimum has been marked),
- 8) submarkables are kept in a separate container (these do not figure in the population estimate).

9) * Population size estimates for 10/23-25 trapping dates:

$$N = 6,728$$

95% confidence 4,301 to 7,476

Should we go until we get 300+ or quit after a set period of time e.g. 1 day?

*

Kynard's memo to Terry Peters dated 11/9/78

POPULATIONS APPEARS TO BE DOWN FROM LAST 2 YR.

SET TRAPS ON SAT. AFTERNOON TRAPPED AND
FIN CLIPPED (TIP OF LEFT PECTORAL FIN) ~~#~~ 153
FISH.

TOOK WATER TEMP. AND QUALITY EA. 2 HR. FOR
24 HR PERIOD FROM 4/9 TO 4/10

TRAPS RESET A 8:00AM 4/10 WILL TRAP FOR 3 HR AND
CHECK AND RECHECK UNTILL THEY GET 2 TO 3
TIMES THE ORIGINAL NUMBER OF FISH (ANY 400 WOULD
BE IDEAL) - THIS WILL GIVE THEM A TIGHTER
SCOPE ON RATIO OF CLIPPED TO NON CLIPPED FISH
"PETERSON ESTIMATE" USED TO DETERMIN POPULATION
18 TO 20 TRAPS SET DEEP, SHALLOW, DEEP, SHALLOW AROUND
POND.

3 TO 4 TRAPPED FISH PLACED IN JARS FOR EXAMINATION/
= CLIPPING - DATA RECORDED - # CLIPPED / # UNCLIPPED

TRAPPED FISH ARE MEASURED AND SEXED.

SAMPLES OF AQUATIC VEGETATION AND AQUATIC
INSECTS FROM ALL HABITATS (INCLUDING BOTTOM LIFE)
ARE TAKEN. ALSO SPECIMANS OF PUP FISH
ARE SOME TIMES TAKE - (THIS TIME TO
ATTEMPT TO FIND OUT ~~IF~~ WHY LAST FALLS
POPULATION WAS DOWN IN THE ADULT CLASS)

SUPPLIES: METAL MIND TRAP

MEMPHAS NET & TWINE

MEMPHAS, TENN.

APX \$2⁵⁰ - \$3⁰⁰ EA.

ALSO GET A LIVE FISH

HOLDING NET TO HOLD

FISH IN WATER

MODIFIED WITH WINDOW

SCREEN TO STOP YOUNG FISH BETWEEN JUNE - SEPT.
- OVER -

Written by
Bob Garrett who
assisted Kynard
in his studies

AQUIFIER

LONG-LIFED

MODEL #1200

VOLT DC 1.5V

OFFICE SPECIALTIES CO. INC.

2806 BRANARD ST.

HOUSTON, TX, 7706

(from Kyward's
original instructions),
J

- 1 -

Summary of 4/10/77 census

4/10/77

NOTES by Bob Garrett (Kynard's assistant in his studies of the QBC pupfish of 19__).

1) notes that population appears "down" from the last two years (1976/77).

2) clipped left pectoral fin on 153 fish

3) water temp. & quality [?] taken at 2 hr. intervals during the 24 hr. period from 4/9 to 4/10

4) traps were reset beginning at 8:00 am on 4/10. Checked & rechecked traps for 3 hrs. trying to obtain 2-3 times the original number of fish (153). This is to "give them [?] a tighter scope on the ratio of clipped to non-clipped fish "Peterson estimate" used to determine population".

5) 18 to 20 traps were set alternately "deep & shallow around pond"

6) 3 to 4 fish were placed in a jar at a time "for examination and clipping (# clipped / # unclipped). Trapped fish are measured & sexed"

[I assume at this time they determined whether the fish were markable > 22 mm or unmarkable < 22 mm. Numbers for both types were recorded. B. Mike]

7) Samples of aquatic vegetation and aquatic insects were taken from all habitats and a few pupfish [?] to try to determine why the adult class population of last years fall census was down.

8) [no estimate of population size was included with these notes!]

[No mention is made in these notes of trap locations in the pond or numbers of traps placed. No specific notes are made about depth of trap placement. No mention is made of where the marked & submarkable fish were returned to the pond (location - eg. in the vicinity of the trapped location?). In Kynard's first technical report (1976) he mentions that all trapped fish were returned to the same location of initial capture and that during the 2nd trap day

"all fish were removed from the traps each 1-2 hrs. [but no mention made how many times in the course of the day] when marked & sub-markable sizes were again counted.

* Population size estimate for October 22, 1975; $N = 7,294$
95% confidence = 6228 to 8589

* Population size estimate for June 10, 1976; $N = 3367$
95% confidence = 3073 to 3996

No attempt is made to explain the apparent mortality [one might question the census methods].

* Kynard, Boyd E., 1976. Preliminary Study of the Desert Pupfish and their habitat at QBB Spring, AZ.