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cc: Education-Game
Dr. Brown

INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
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ESTIMATED COST AND EQUIPMENT FOR LAKE SURVEY

by

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I. Mapping unit

A. Personnel (salary includes \$25 per month for each man for expenses)

1 Leader - \$130 per month

2 Assistants at \$105 per month

Daily salary	\$ 11.33 per day
Travel	2.50 " "
Depreciation or rent of equipment	<u>1.50 " "</u>
Total operation cost per day	\$ 15.33

B. Equipment

Alidade, plane table, tripod outfit with compass and level	\$ 50.00
Steel chain	15.00
Ice spud	5.00
Electric ice drill + 2 storage batteries mounted on sleigh	70.00
Sounding line, device and reel	10.00
Drawing board, pencils, pens, paper, etc. ...	15.00
Panel truck for transportation	<u>600.00</u>
Total outlay for equipment	\$ 765.00

(40)

C. Average time required to map lakes by experienced parties.

Size of lake,
medium ice conditions

20 - 50 acres	1 - 2 days
50 - 100 acres	2 - 3 days
100 - 200 acres	3 - 4 days
200 - 300 acres	4 - 5 days
300 - 500 acres	5 - 7 days
500 - 1000 acres	6 - 10 days
1000 - 2000 acres	8 - 12 days
2000 - 5000 acres	10 - 15 days

II. Fisheries survey unit

A. Personnel (salary includes \$25 per month for each man for expenses)

- 1 Leader - \$175 per month
- 2 Assistants at \$150 per month
- 1 Cook helper - \$105 per month

Daily salary	\$ 19.66
Travel expense	2.50
Depreciation of equipment, etc.	<u>1.50</u>
Total operation cost per day	\$ 23.66

B. Equipment

1. Scientific and field equipment

1 truck	\$ 900.00
1 chain sounding line and reel ...	5.00
2 calibrated rope lines	2.00
1 - 100 ft. steel tape	10.00
1 water glass telescope	7.50
4 pair boots at \$6.00	24.00
3 pair waders at \$12.00	36.00
1 boat and oars	80.00
1 boat trailer	25.00
1 outboard motor	75.00
1 - 1/2 doz. pack shear pins	
4 life preserver cushions at \$2 ..	8.00
2 pair forceps, small at 50¢	1.00
1 pair forceps, large	1.75
2 - 125 ft. gill nets - experimental at \$20	40.00
1 - 100 ft. bag seine	35.00
1 - 25 ft. bag seine	8.00

2 - 10 ft. common sense seines at 75¢	⋄	1.50
2 pair braille poles at 50¢		1.00
1 Welch balance (gram arm)		12.50
1 Chatillon balance (15 lbs.)		8.50
2 measuring boards at \$1.50		3.00
1 gross of vials		3.50
2 doz. 2 qt. jars at 80¢ a doz. ..		1.60
1 - 10 gal. fish can		2.00
1 instrument box		2.00
1 chemical box		6.00
1 chemical kit		5.00
1 pH outfit		75.00
1 reversible thermometer		50.00
3 pocket thermometers at \$2		6.00
1 Juday bottle		12.50
1 Ekman dredge		40.00
2 messengers at 75¢		1.50
1 plankton net		12.00
1 Secchi disc		2.00
1 set of sieves		5.00
1 plant hook		2.00
100 blotters (plant)		3.00
100 separators (plant)		1.00
2 plant presses at \$1		2.00
2 enamel sorting pans at \$1		2.00
6 anchor weights at 50¢		3.00
4 net floats at 75¢		3.00
1 net pan		<u>4.00</u>
Total cost of scientific and field equipment		⋄ 1528.85

2. Chemical supplies

O₂ Determination

42 oz. H₂SO₄ in 3 - 250 cc bottles
 500 cc KMnO₄ in liter bottles
 750 cc K₂C₂O₄ in liter bottles
 800 cc MnSO₄ " " "
 2 liters KI-KOH in 2 - 1 liter bottles
 250 cc starch in 250 cc bottle
 1 liter Na₂S₂O₃ in 2 - 1 liter bottles
 500 cc K₂Cr₂O₇ in 2 - 250 cc bottles

CO₂ Determination

250 cc ph-th in 250 cc bottle
 250 cc N/44 NaOH in 250 cc bottles
 250 cc M.O. (alkalinity) in
 250 cc bottle
 2 liters N/50/H₂SO₄ in 2 liter bottles

Indicators

Thymol blue
Phenol Sulpho Red
Hellige dichlorphenol red

1 liter Bouin's solution
4 liters distilled water in
4 - 1 liter bottles
10 - 250 cc bottles -
2 liter g.s.
1 tube vaseline
Starch powder
Na₂S₂O₃ ampules
1 adhesive tape
1 file
1 - 100 cc beaker
1 Erlenmeyer flask
1 - 50 cc graduate
1 stirring rod
2 - 1 cc pipettes
2 doz. Syracuse watch glasses
1 gal. alcohol
1½ gal. formalin
3 centrifuge tubes
6 medicine droppers
2 ft. rubber tubing
glass tubing

Chemical supplies for
each party for one
season (3 months) \$ 50.00

3. Camping equipment

1 shovel	\$ 2.00
1 axe	2.00
1 hammer	1.00
1 saw (cross cut)	2.00
1 screw driver75
1 pliers25
1-3 lbs. nails	
1 wall tent (10x12)	45.00
2 umbrella tents (9x9) at \$30 ...	60.00
2 roll top tables at \$5	10.00
4 chairs at \$4	16.00
4 cots at \$3	12.00
2 lanterns at \$5	10.00
6 mantles	
2 generators	
1 funnel	
1 tarp	4.00
2 insect sprayers at 25¢50
1 first aid kit	2.00
1 stove	6.00

1 - 1 gal. gas can (lantern and stove50
1 - 2 gal. gas can (outboard motor)	.75
1 - 5 gal. gas can (car)	1.25
3 pails at 50¢	1.50
1 tub75
1 mess outfit for four	<u>15.00</u>
Total cost of camping equipment	\$ 193.25

4. Office supplies

1 Michigan Lakes and Streams Directory	
1 The Improvement of Lakes for Fishing	
1 penholder10
1 foot ruler25
1 boxwood scale	1.00
2 metal note book covers	2.00
2 paint brushes50
1 celluloid triangle75
1 drawing board	3.00
1 map measure	5.00
<u>1 planimeter</u>	<u>12.00</u>
6 car report cards	
15 large stamped envelopes	
15 letterhead	
1 doz. carbon paper	
6 large manila envelopes	
12 small manila envelopes	
3 scratch pads	
3 pocket notebooks	
1 pkg. rubber bands	
1 bottle India ink	
1 box paper clips	
1 box thumb tacks	
6 - 3H lead pencils	
2 - 4H lead pencils	
6 Spencer #1 pen points	
1 art gum	
100 sheets plain paper	
4 diaries	
1 set of colored pencils	
gray	
green	
yellow	
orange	
blue	
brown	
1 household cement	
1 white paint ($\frac{1}{2}$ pt.)	
1 black paint ($\frac{1}{2}$ pt.)	
3 stencils	
12 ft. drawing paper	
12 ft. tracing paper	
6 ft. cross section paper	

Survey cards
 25 white
 50 bottom
 50 chemistry
 50 summary
 100 fish
 50 parasite
 50 metal tags
 100 insect pins
 200 plant collection tags
 200 labels
 1 box scale envelopes
 1 ball net twine
 1 solo repair kit
 25 yards cheesecloth \$ 40.00

Total cost for
 office supplies \$ 64.60

Total Cost of All Equipment \$ 1,836.70

C. Average time required to make fisheries survey of lakes by trained parties.

Size of Lake

20 - 50 acres	2 - 3 days
50 - 100 acres	3 - 4 days
100 - 200 acres	4 - 6 days
200 - 300 acres	5 - 7 days
300 - 500 acres	6 - 8 days
500 - 1000 acres	8 - 12 days
1000 - 2000 acres	10 - 15 days
2000 - 5000 acres	11 - 18 days
5000 - 10,000 acres	15 - 24 days

NOTE: Mapping is done during the period of ice cover and the fisheries surveys are made during the summer.

INSTITUTE FOR FISHERIES RESEARCH

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