INSPECTION AND ANALYSIS
OF
RETRIEVED GEAR FROM ENTANGLED WHALES



SCOPE OF WORK

- EXAMINE 65 SETS OF GEAR COLLECTED BY NMFS AT RI FACILITY
  PLUS ONE SET OF CANADIAN GEAR
- TAKE 123 ROPE SPECIMENS FOR PHYSICAL ANALYSIS
  AND STRENGTH TESTING PLUS 10 NEW
- TABULATE ID, DATE, PHYSICAL DATA, PROBABLE USE, CONDITION
  ON A SPREADSHEET
- PREPARE DATA SHEET FOR EACH GEAR SET
  PHOTO OF GEAR SET, SPECIMEN PHOTOS, DESCRIPTIONS
- RESEARCH STRENGTH DATA FOR COMPARABLE NEW ROPES
  (consensus of catalog data from 10 rope makers and 2 standards)
- OBTAINED DIGITAL COPIES OF NMFS “FISHERY INTERACTION GEAR ANALYSIS” (contains details of history and make-up of gear set)

SPREADSHEET

CONTAINS FOLLOWING

FIELD AND NMFS ID'S

INVENTORY DATE

MEASURED DIAMETER Example - 0.350 in

NOMINAL DIAMETER Example $^{3}/_{8}$ in (0.375)

ROPE TYPE (3-STRAND, etc.)

LINEAR DENSITY (lbs per 100 ft)

MATERIAL

TESTED OR ESTIMATED STRENGTH

STRENGTH OF COMPARABLE NEW ROPE

SPECIFIC GRAVITY

PROBABLE USE

CONDITION

TERMS

- Polypropylene = PP = Poly
- Polyester = PET = Dacron = Dac
- Polysteel = Polystl = Steel Line = co-polymer
- Combo Ropes = PET / PP = Poly Dac or PET / Polysteel
- Nylon = Nylon

DATA SHEETS
GEAR / ROPE DESCRIPTIONS / PHOTOS







GEAR SET



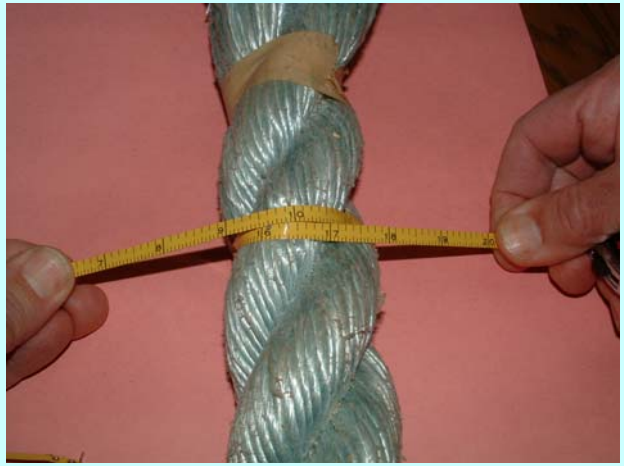
ROPE SPECIMENS

PROCEDURE

- Size measurement

  Small ropes with caliper

  Larger ropes with tape



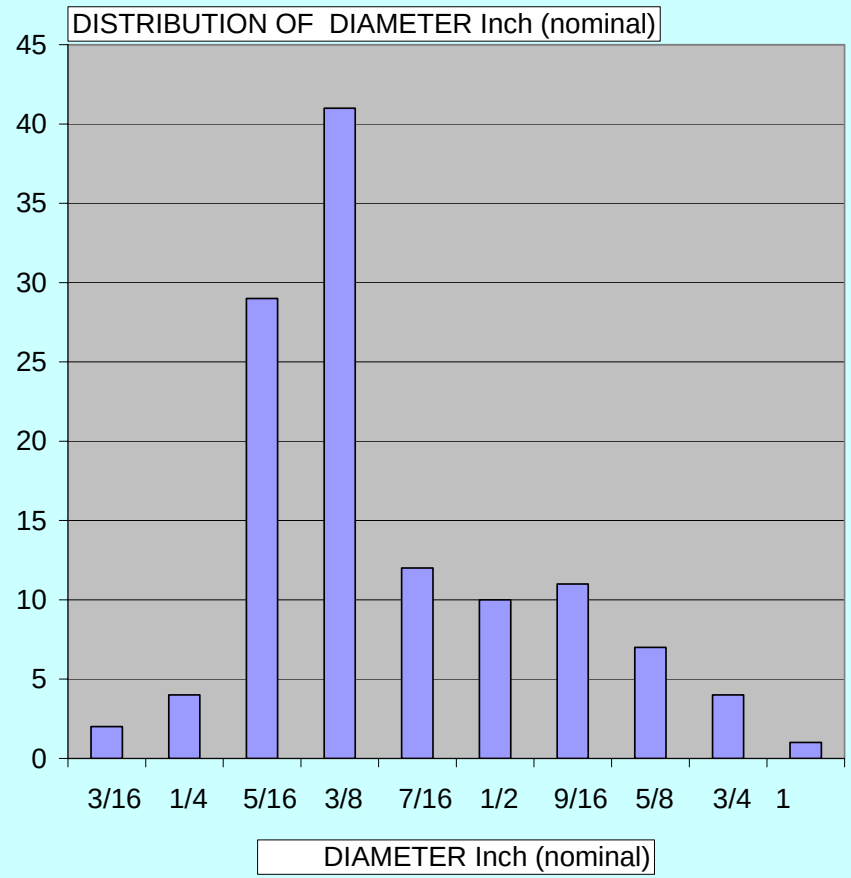


RESULTS - SIZE

TABLE 1
Size - Nominal Diameter

Size results

$^{5}/_{16}$ & $^{3}/_{8}$ dominate

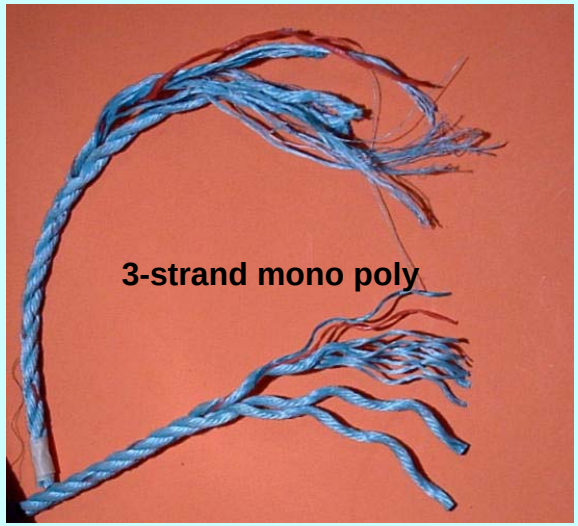


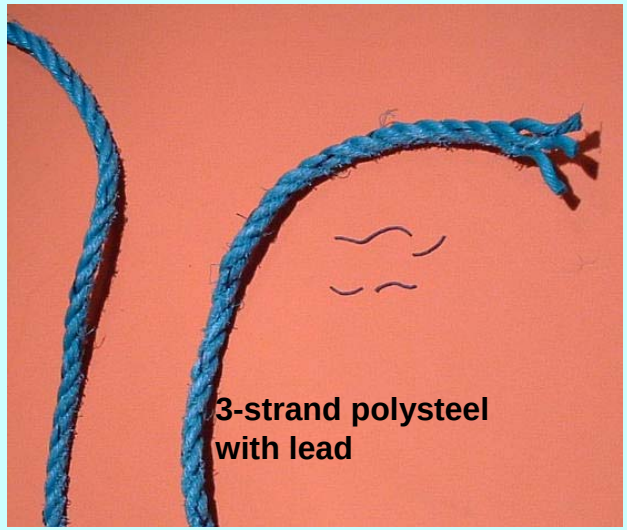
PROCEDURE
RESULTS

Construction

Visual

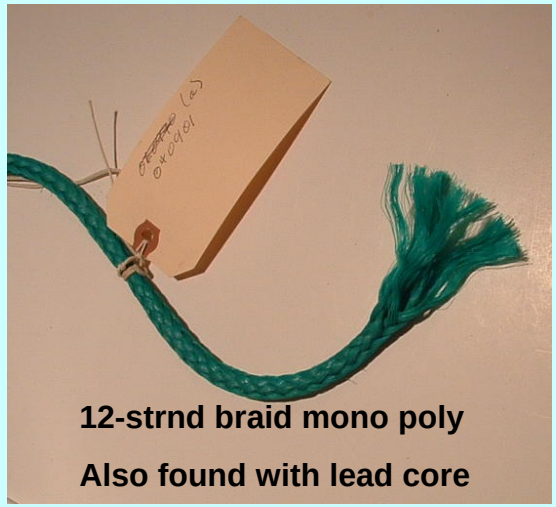
Disassembly





Results

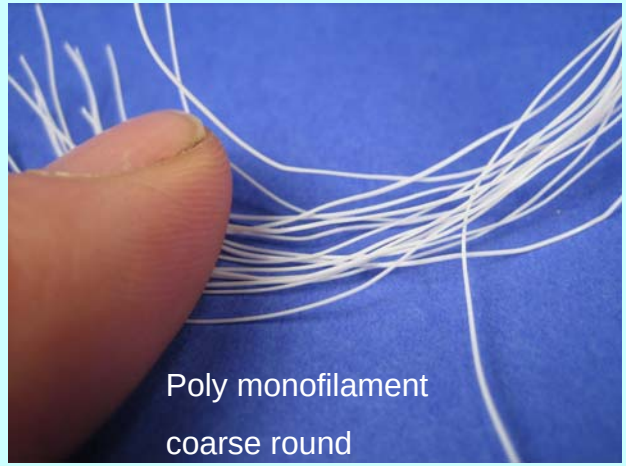
95% 3-strand
with hard lay

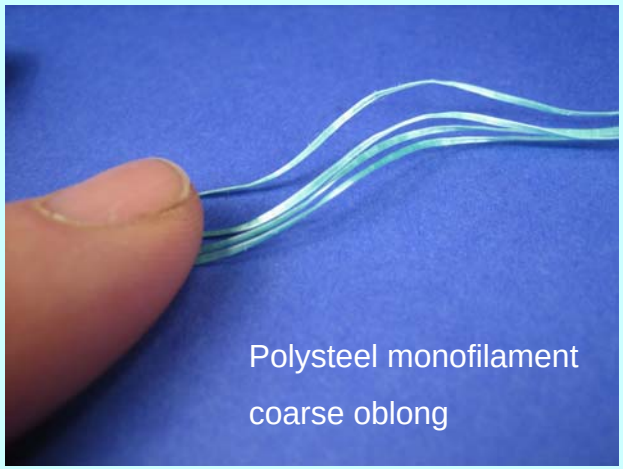




PROCEDURE

- Material
  - Color of filament
  - Size of filament
  - Shape of filament
  - Buoyancy test
  - Burn test





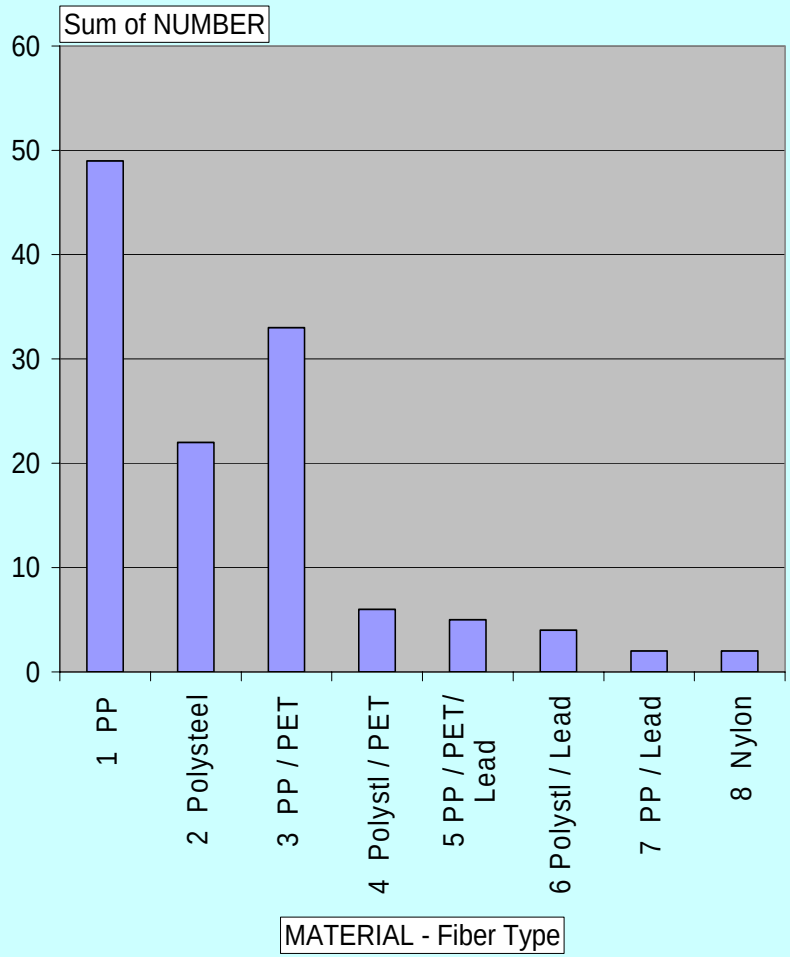


RESULTS - MATERIAL

TABLE 2
MATERIAL

DISTRIBUTION

Polypropylene	40% float
Polypro+Polyester	27% sink
Polysteel	18% float
Polysteel+Polyester	5% sink
Polypro+PET+Lead	4% sink
Polysteel + Lead	3% sink
Nylon	2% sink
Polypropylene + Lead	1% sink



PROCEDURE

Strength values for recovered lines

- Break test of most whole ropes
- Strand tests of selected ropes
- Estimates based on condition and new rope value
  (for ropes not tested)

New rope strength values

- Published data for similar ropes (10 sources)

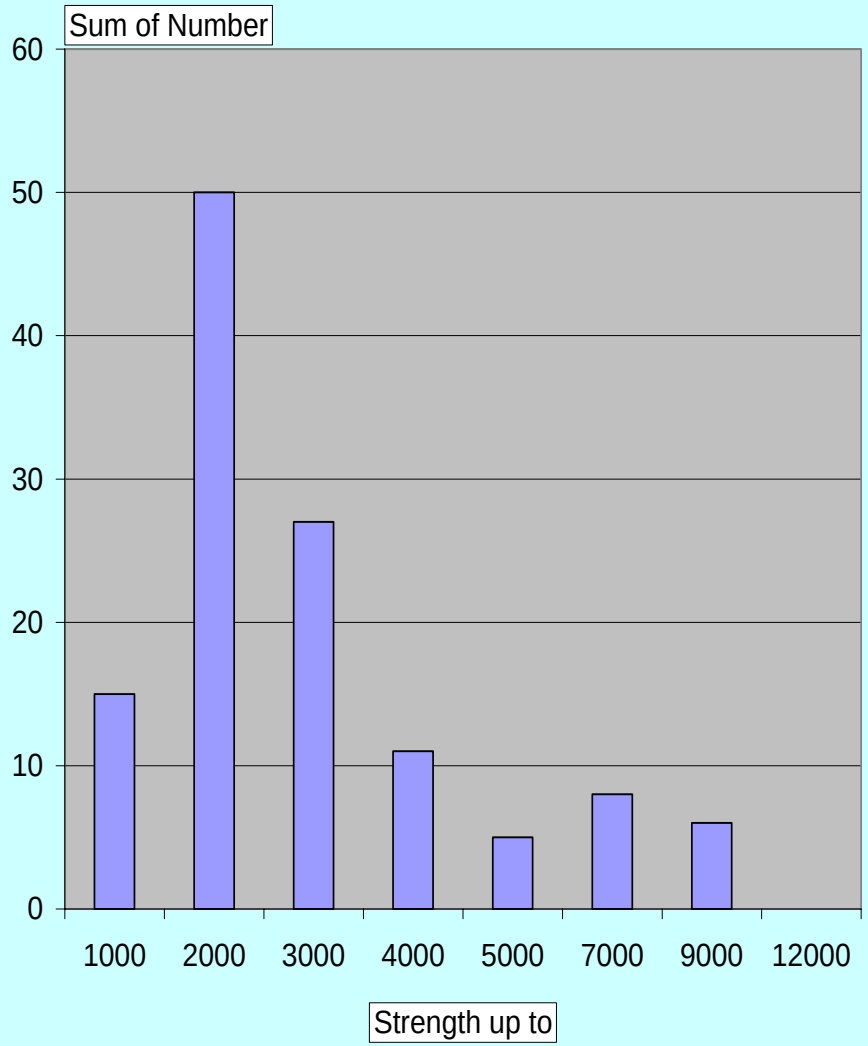
Recovered Trap Line





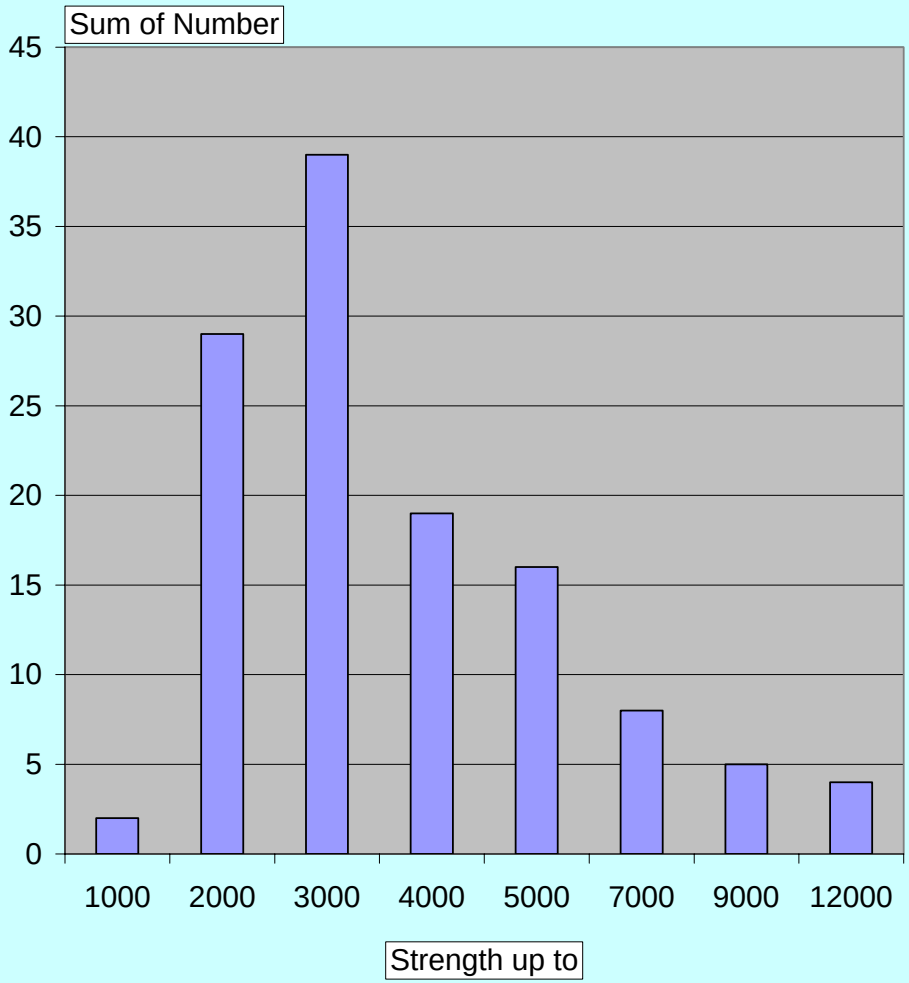
RESULTS – RECOVERED STRENGTH

TABLE 3
Estimated Actual Strength



RESULTS – NEW STRENGTH

TABLE 4
Estimated New Strength



PROCEDURE

SPECIFIC GRAVITY
(Range - 1.000 to 1.200)

(Seawater – 1.030)



SUSPEND SPECIMEN IN KNOWN SPECIFIC GRAVITY SOLUTION

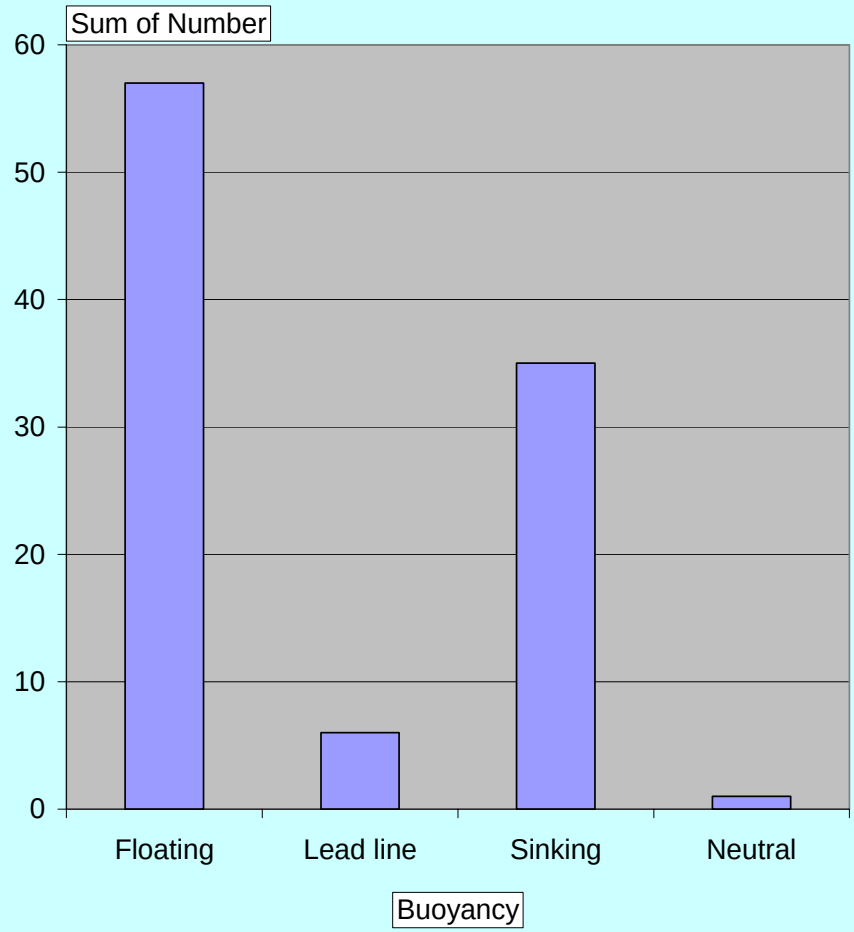


HYDROMETER ACCURATE TO 0.001

MEASURES SP GR OF SOLUTION

RESULTS - BUOYANCY

TABLE 5
Distribution of Specific Gravity



PROCEDURE

Use (fishery application)

Inspection of recovered entanglement

Fishery Interaction Gear Analysis
(by NMFS)

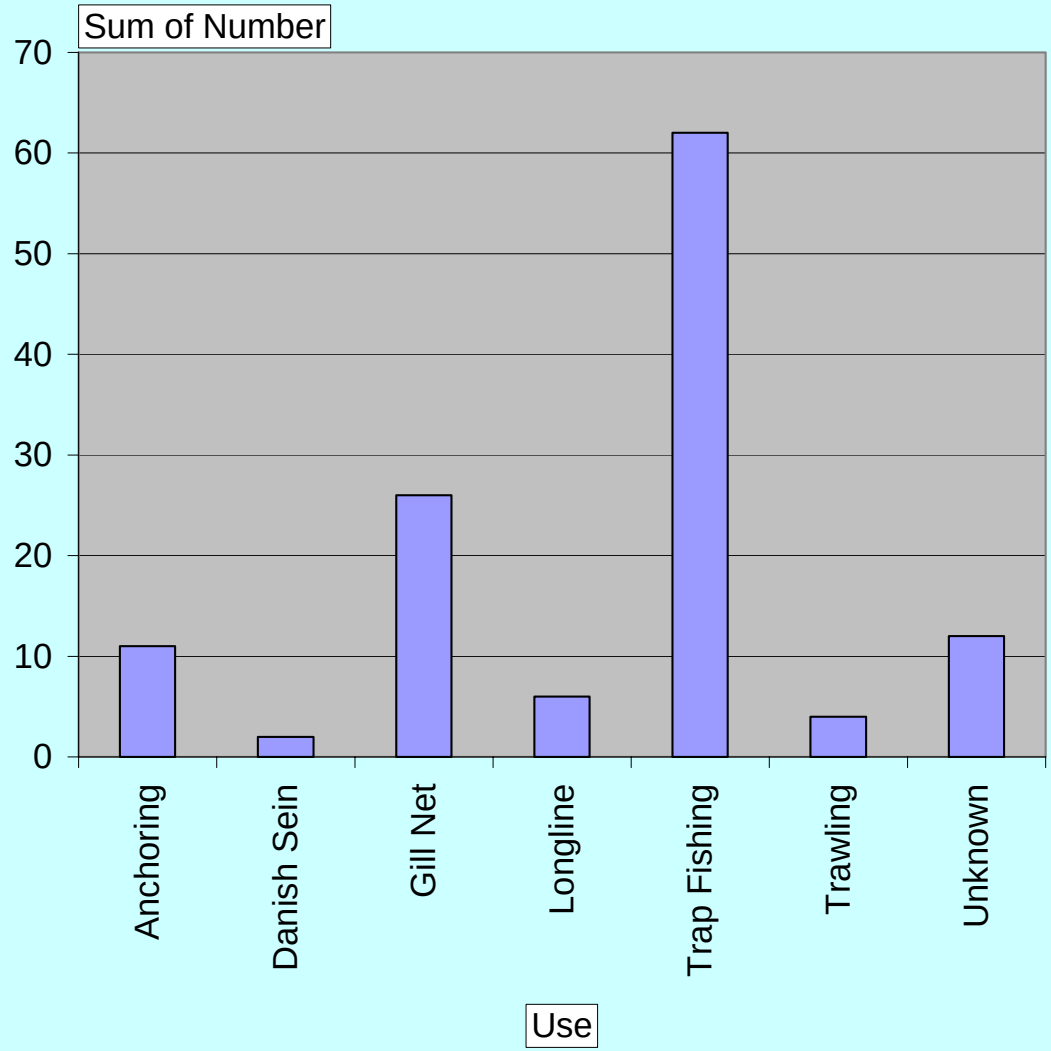






RESULTS – USE OF LINES

TABLE 6
Fishing Use



PROCEDURE

Condition

Judgment call by inspector

Good	(1.0 factor)
Moderate	(0.8 factor)
Fair	(0.6 factor)
Poor	(0.4 factor)
Severe	(0.2 factor)



Severe



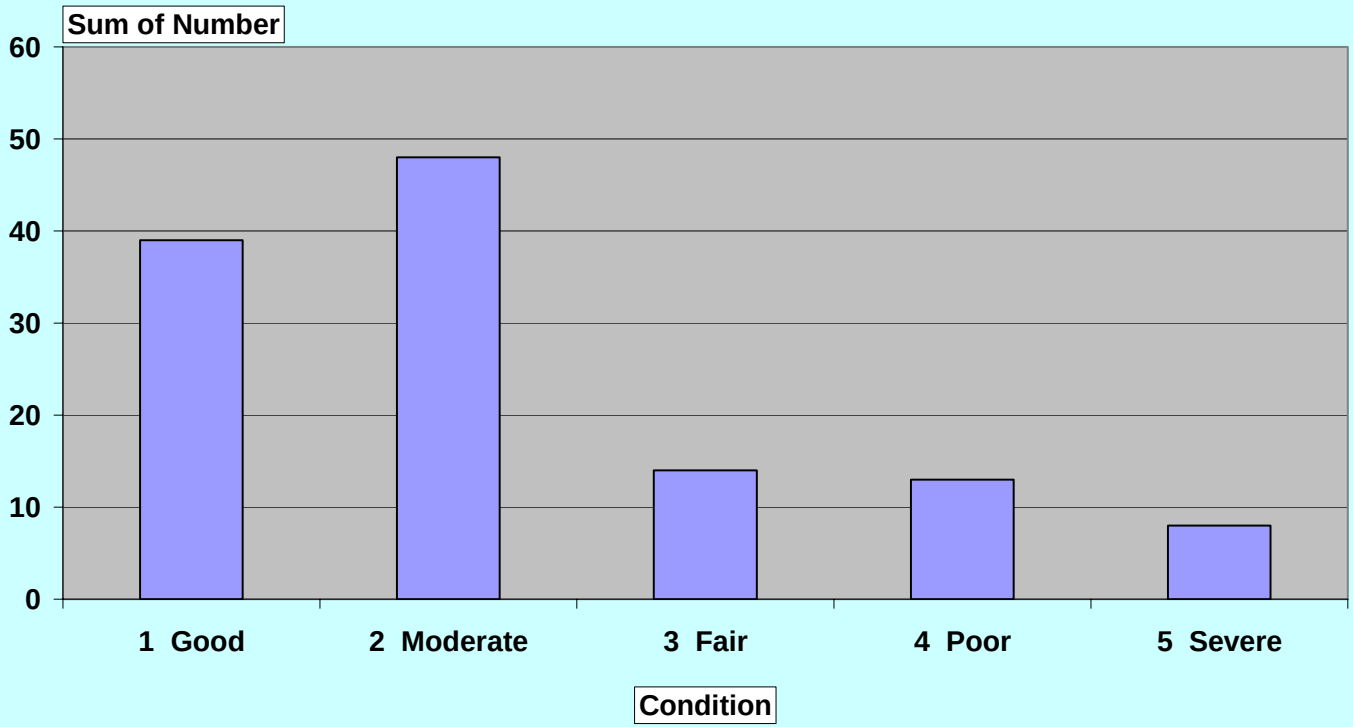
Good



Moderate

RESULTS - CONDITION

Table 7
Condition of Lines



CONCLUSIONS

- 3-strand ropes with hard lay are by far dominate
- Polypropylene fiber was found in about 50% of the specimens (floating)
- Polysteel was about one quarter the number of polypropylene (floating)
- Combo ropes with polyester represented about 25% (sinking)
- Rope sizes 5/16 & 3/8 dominate
- Strength of recovered lines was predominately in range of 2000 to 3000 lbs
- Strength of new ropes was in the range of 2000 to 5000 lbs
- Sinking lines were 28% and leadlines were 5%
- Trap fishing represented 50% of the lines – Gill netting 21%
- 71% of the lines were judged to be in good or moderately good condition.