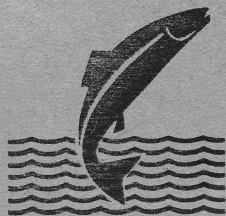


HABITAT IMPROVEMENTS FOR
JUVENILE SALMON
IN LAXÁ Í AÐALDAL

Preliminary draft for construction

May 5, 1987

SCOTT D. WENGER



VEIÐIMÁLASTOFNUN

Fiskrækt og fiskeldi • Rannsóknir og ráðgjöf.

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EINTAK BÓKASAFNS

VMST-N/ 87012

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HABITAT IMPROVEMENTS FOR JUVENILE
SALMON IN LAXÁ Í AÐALDAL, ICELAND

PRELIMINARY DRAFT FOR CONSTRUCTION

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INTRODUCTION

A survey of Laxá í Aðaldal between Laxárvirkjun and Skjálfandi was performed during the summer of 1986. Environmental conditions, such as substrate composition, water velocity, degree of sedimentation, and amount of interstitial space between submerged rocks were recorded. Potential habitat improvement sites were noted and the results of this analysis are enclosed.

Justification for recommended habitat designs is omitted in this report although it will follow in the comprehensive final report.

Habitat enhancements are primarily for juvenile salmon. They have been designed to be unobtrusive and in compliance with environmental restrictions.

Following the location maps for habitat sites, are details showing construction specifications for each type of habitat structure. Wherever a variety of structure types is possible, alternatives are presented to account for available materials.

INTRODUCTION

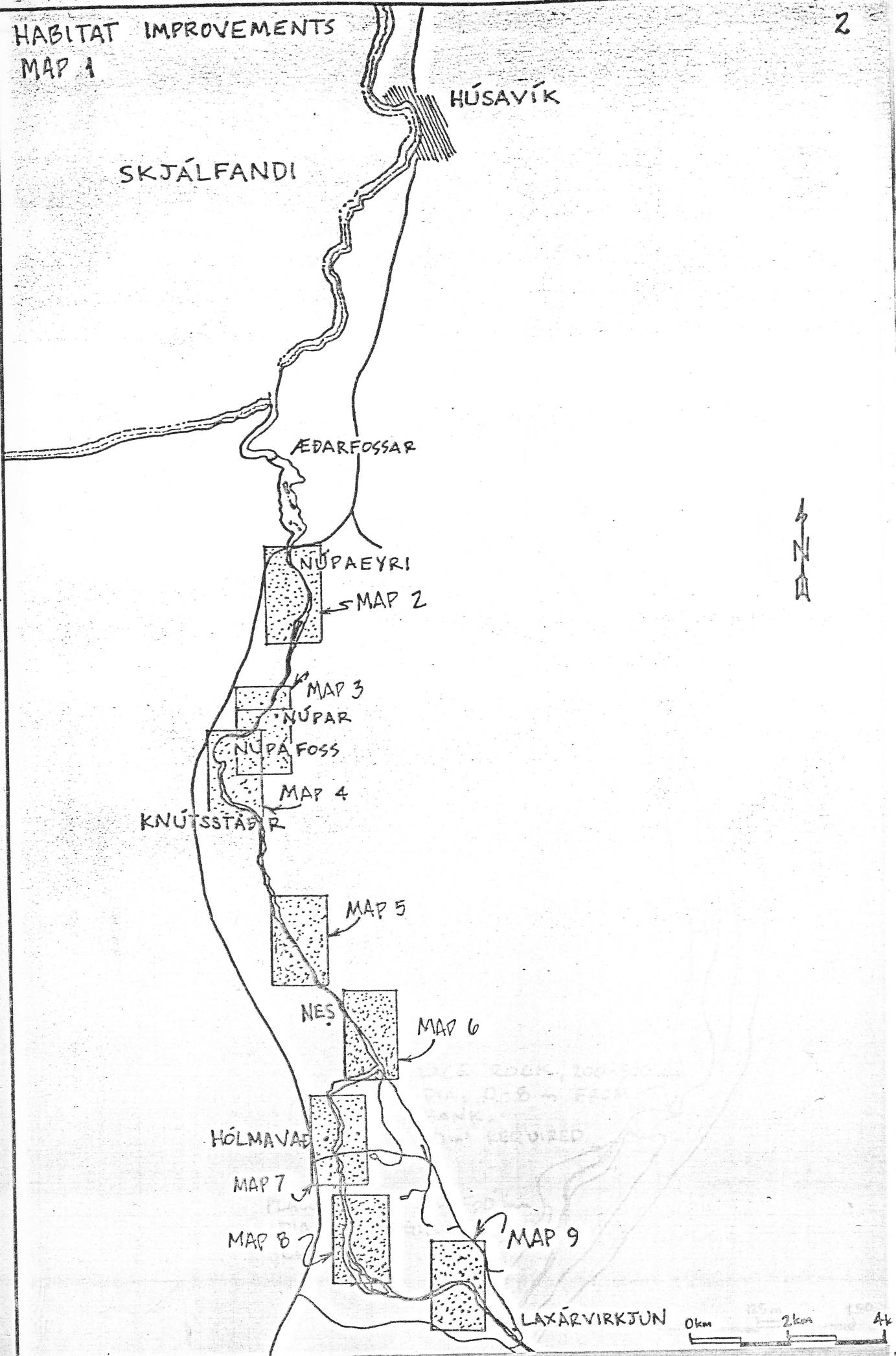
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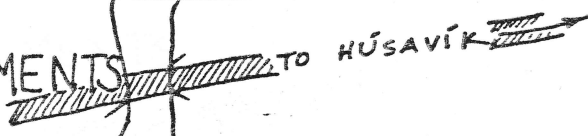
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HABITAT IMPROVEMENTS
MAP 1



HABITAT IMPROVEMENTS

MAP 2



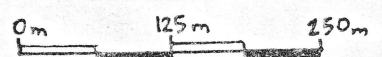
PLACE ROCK, 100-500 mm DIA,
0-2 m FROM BANK. 2
10 m³ REQUIRED.

NÚPAEYRI



PLACE ROCK, 200-500 mm
DIA, 0-8 m FROM
BANK.
10 m³ REQUIRED.

PLACE ROCK, 200-500 mm
DIA, THROUGHOUT
CHANNEL.



HABITAT IMPROVEMENTS MAP 3

4

PLACE ROCK, 100-500 mm
DIA, 0-4 m FROM
BANK. 8m³ REQUIRED.

PLACE ROCK, 100-500 mm
DIA, 0-5 m FROM
BANK.
15m³ REQUIRED.

PLACE ROCK, 100-500 mm
DIA, 0-8 m FROM
BANK. 10m³ REQUIRED.

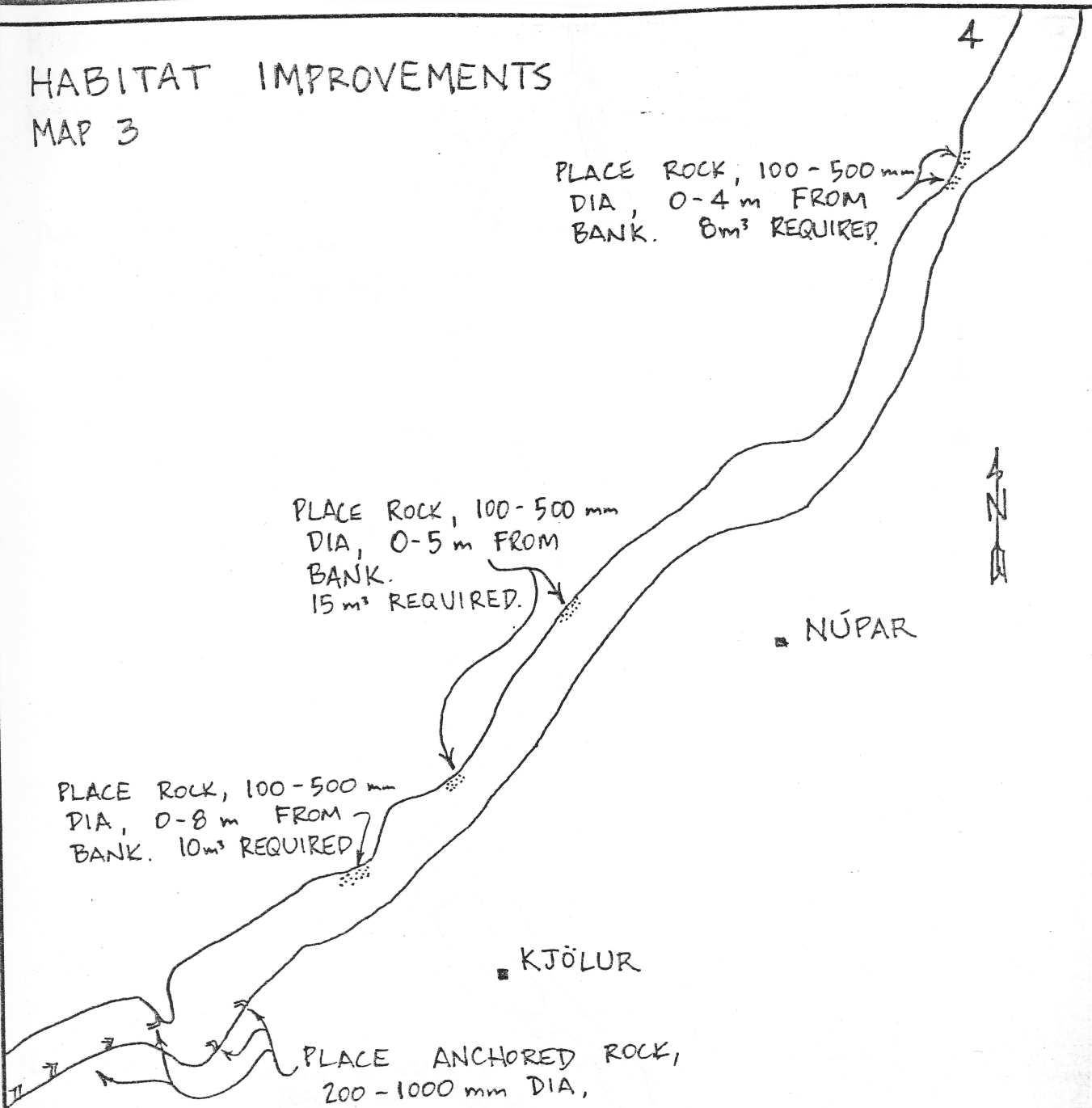
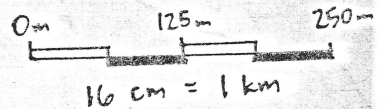
■ NÚPAR

■ KJÖLUR

PLACE ANCHORED ROCK,
200-1000 mm DIA,
0-6 m FROM BANK.
(TYPE A)

PLACE SCATTERED ROCK, 200-1000
mm DIA, ON DETAIL LEDGE.
WIDTH VARIES 2-19 m.

BRÚTSSTADIR



HABITAT
IMPROVEMENTS
MAP 4

PLACE ROCK, 200-500
mm DIA, 0-3 m
FROM BANK.

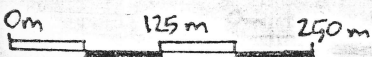
NÚPAFOSS



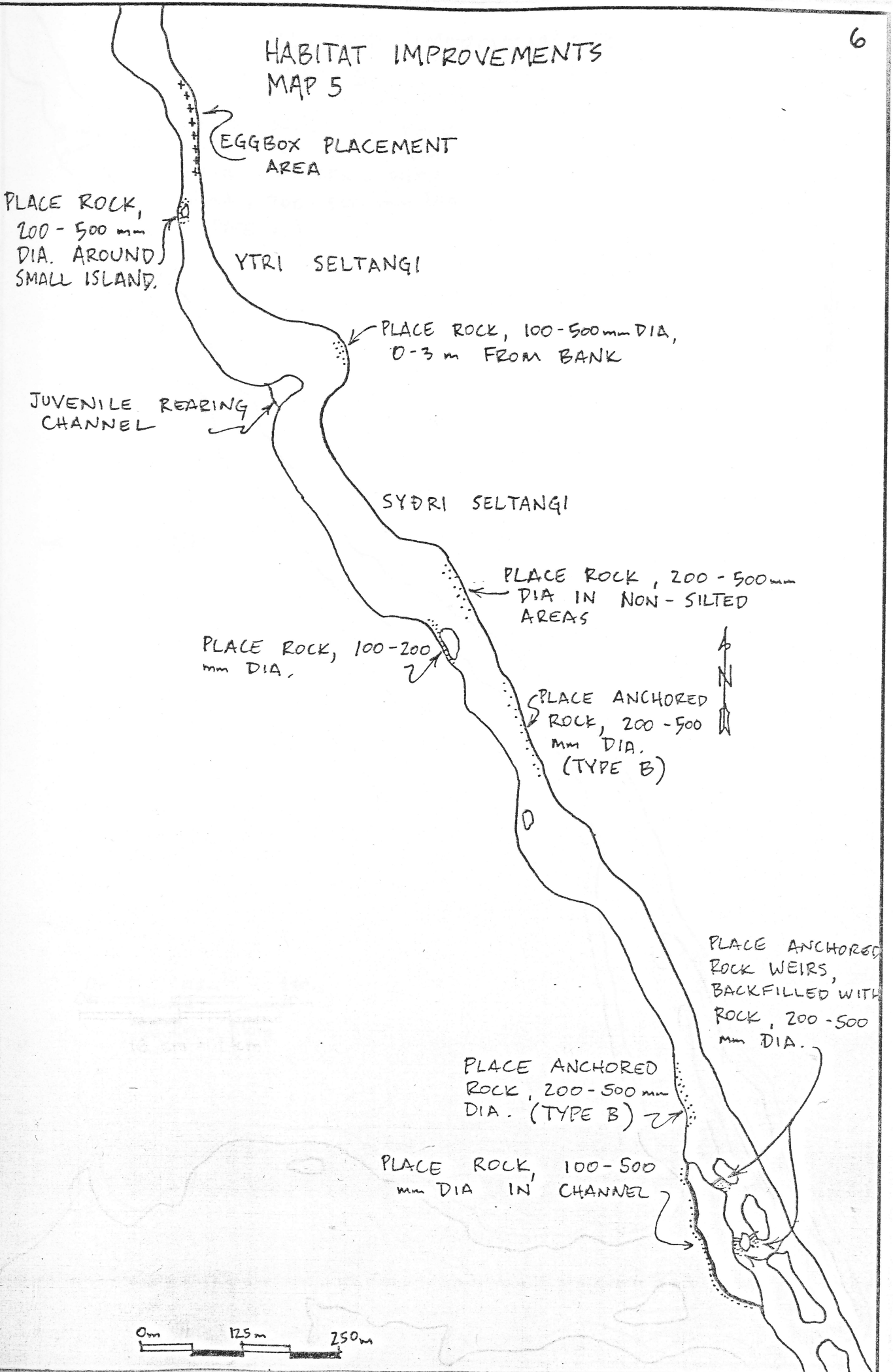
PLACE ANCHORED
ROCK, 200-500 mm
DIA. (TYPE B)

PLACE SCATTERED ROCK, 200-1000
mm DIA ON BEDROCK LEDGE.
WIDTH VARIES 1-15 m.

KNÚTSSTAÐIR



HABITAT IMPROVEMENTS MAP 5



EGGBOX PLACEMENT AREA

PLACE ROCK, 200-500 mm DIA. AROUND SMALL ISLAND.

YTRI SELTANGI

PLACE ROCK, 100-500 mm DIA, 0-3 m FROM BANK

JUVENILE REARING CHANNEL

SYDRI SELTANGI

PLACE ROCK, 200-500 mm DIA IN NON-SILTED AREAS

PLACE ROCK, 100-200 mm DIA.

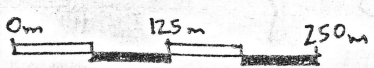
PLACE ANCHORED ROCK, 200-500 mm DIA. (TYPE B)



PLACE ANCHORED ROCK WEIRS, BACKFILLED WITH ROCK, 200-500 mm DIA.

PLACE ANCHORED ROCK, 200-500 mm DIA. (TYPE B)

PLACE ROCK, 100-500 mm DIA IN CHANNEL

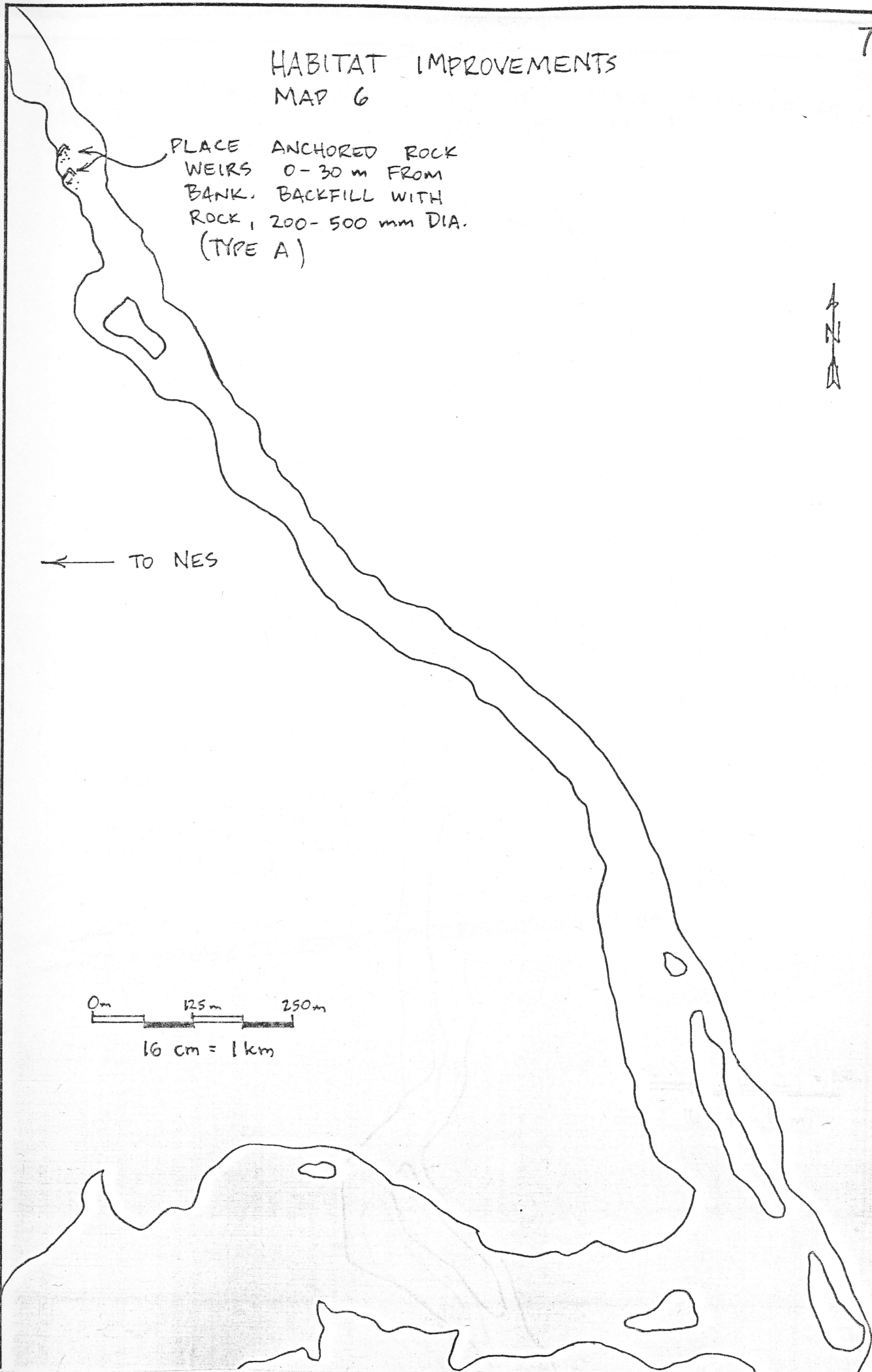
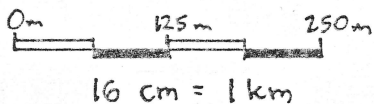


HABITAT IMPROVEMENTS MAP 6

PLACE ANCHORED ROCK
WEIRS 0-30 m FROM
BANK. BACKFILL WITH
ROCK, 200-500 mm DIA.
(TYPE A)



← TO NES



HABITAT IMPROVEMENTS
MAP 7

PLACE ANCHORED LOGS.
SEE PG. 16.

PLACE ANCHORED
ROCK, 200-500 mm
DIA. (TYPE B)

EGGBOX PLACEMENT
SITE

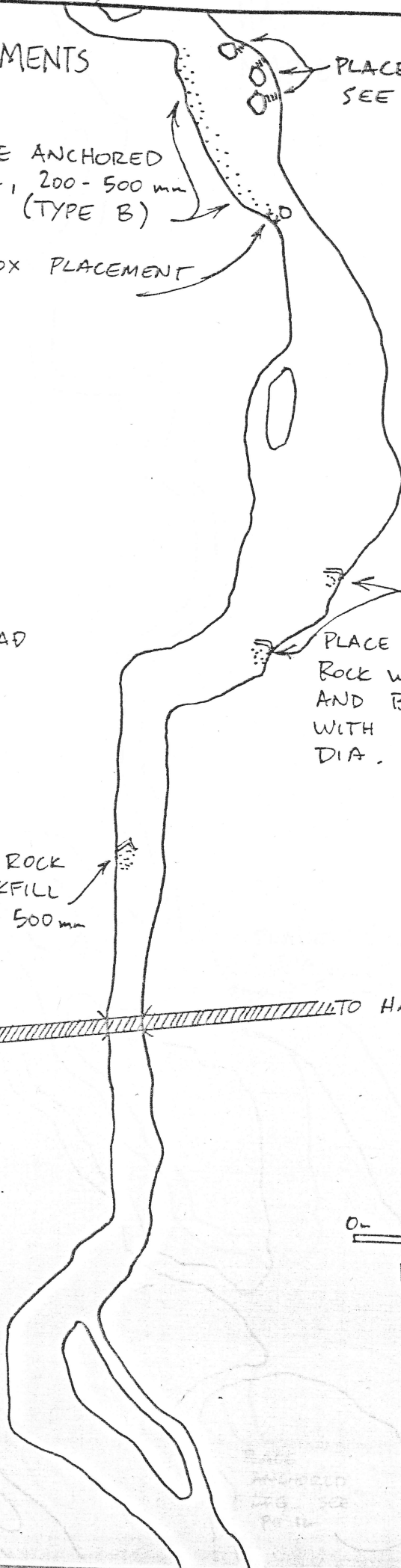
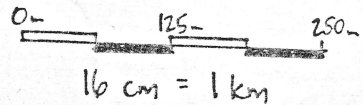
HÓLMAVAD

PLACE ANCHORED
ROCK WEIRS
AND BACKFILL
WITH ROCK, 200-500 mm
DIA. (TYPE A)

PLACE ANCHORED ROCK
WEIR AND BACKFILL
WITH ROCK, 200-500 mm
DIA. (TYPE A)

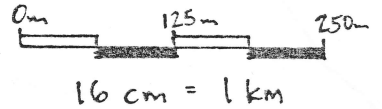
← TO ROAD 845 →

← TO HAGI →



HABITAT IMPROVEMENTS MAP 8

PLACE
ANCHORED
ROCK WEIR
BACKFILLED
WITH ROCK, 200-
500 mm DIA.
(TYPE A)



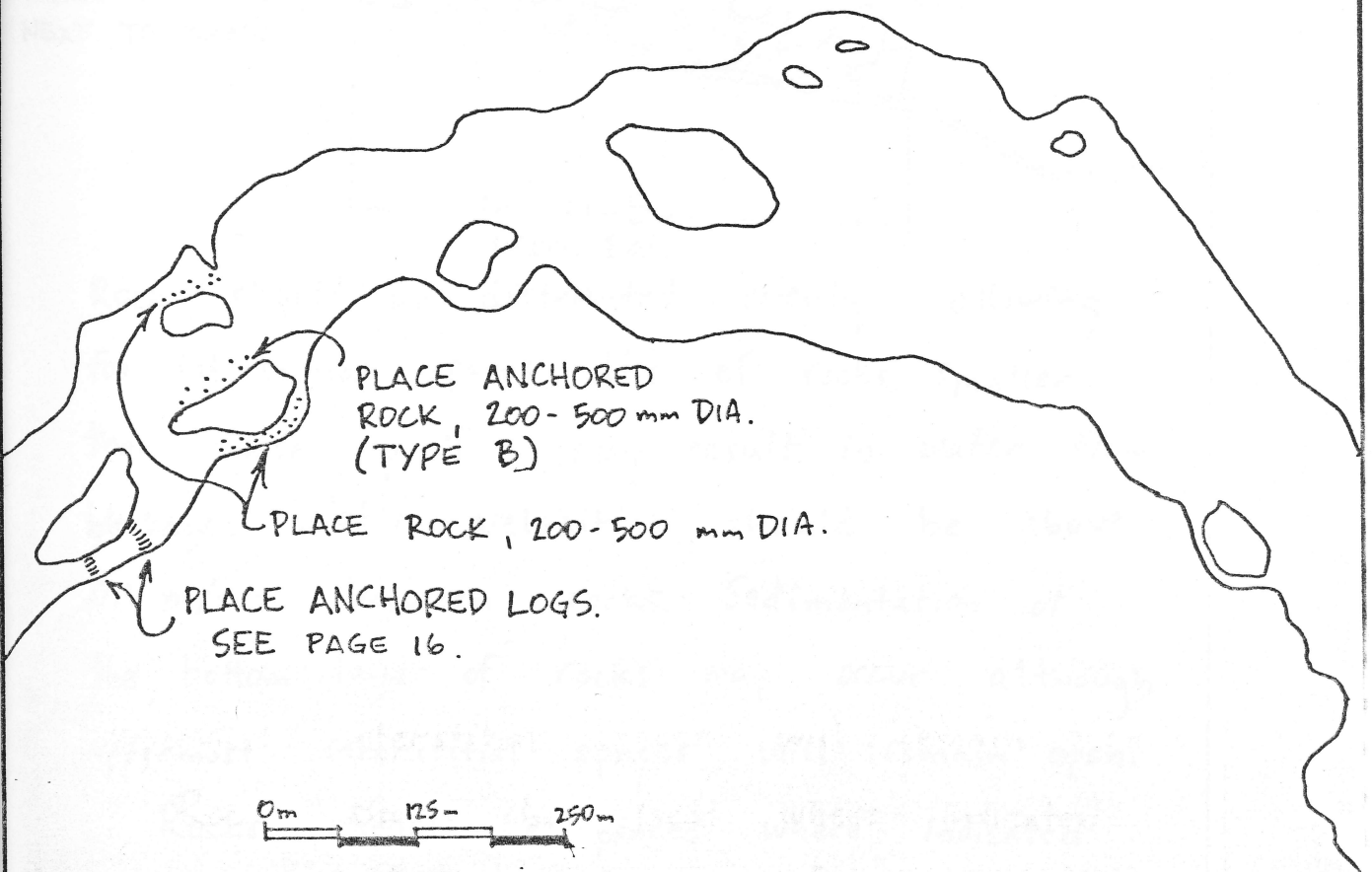
PLACE ROCK, 200-500 mm
DIA, 0-3 m FROM BANK.

PLACE ANCHOR
ROCK WEIR
0-15 m FROM
BANK
(TYPE A)

PLACE
ANCHORED
LOG, SEE
PG. 16

ADALBOL

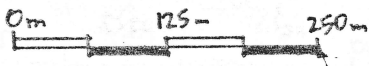
HABITAT IMPROVEMENTS MAP 9



PLACE ANCHORED
ROCK, 200-500 mm DIA.
(TYPE B)

PLACE ROCK, 200-500 mm DIA.

PLACE ANCHORED LOGS.
SEE PAGE 16.



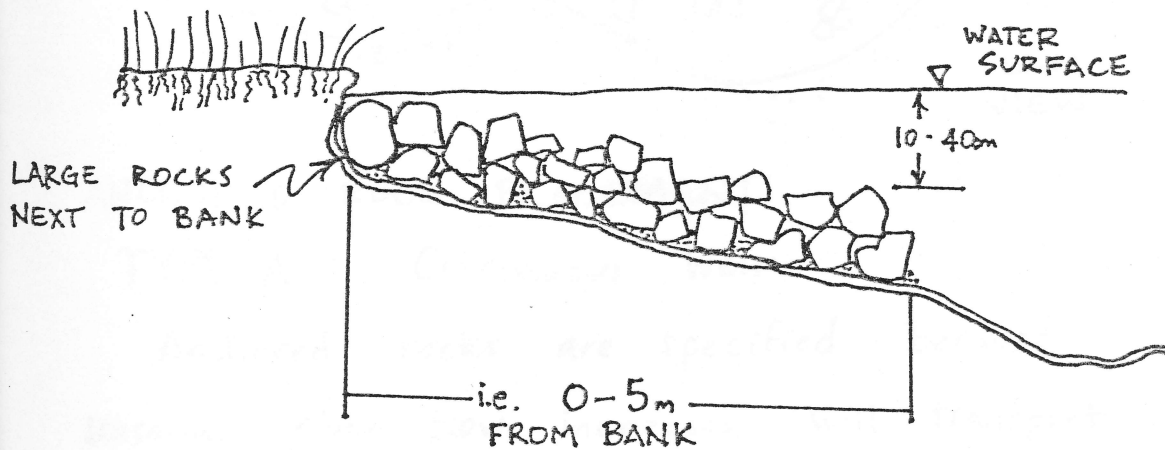
16 cm = 1 km

• ADALBÓL

SPECIFICATIONS

ROCK PLACEMENT - UNANCHORED

The following typical cross-section illustrates correct placement of unanchored rocks.

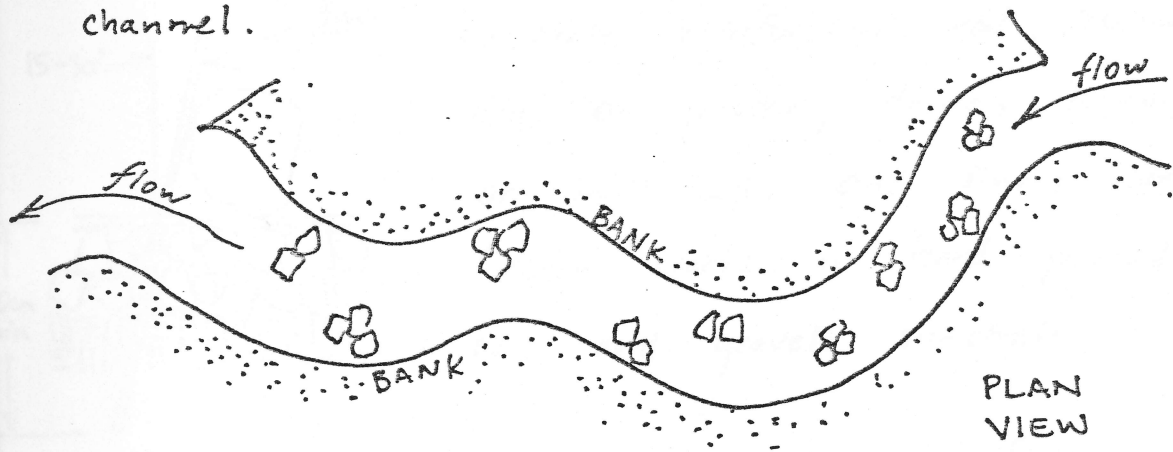


Rock should be distributed evenly, allowing for interstitial spaces. Use of rocks smaller than those specified may result in water flow blockage. Water velocities should be above 0.1 m/sec. between rocks. Sedimentation of the bottom layer of rocks may occur although uppermost interstitial spaces will remain open.

Rocks should be placed where indicated on maps 2-9, in regions of steady water velocity (between 0.1 and 0.5 m/sec.) and away from sediment deposition areas.

Where rock is placed throughout a channel, groupings of 2 or 3 rocks are desirable.

The following illustrates rock placement in a channel.

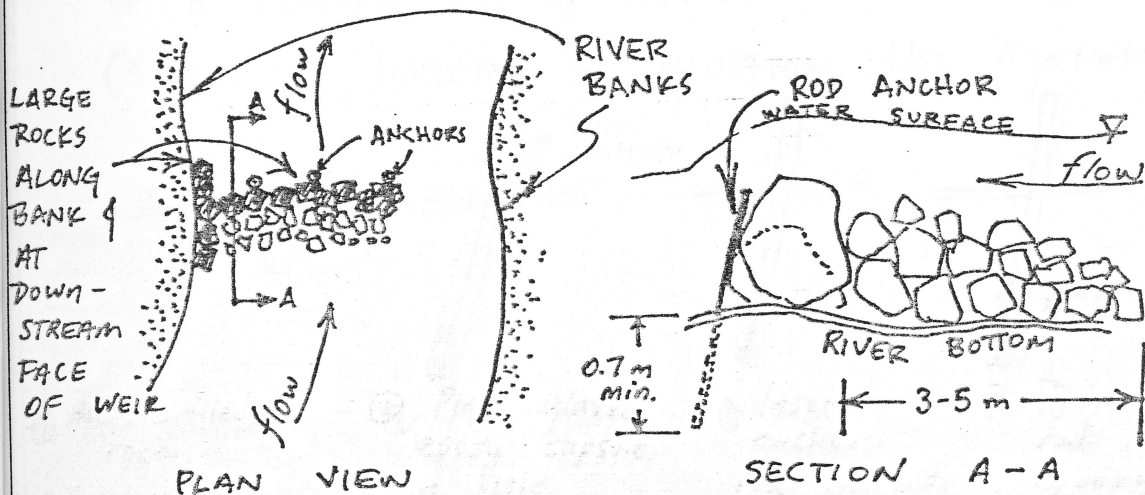


ANCHORED ROCK PLACEMENT

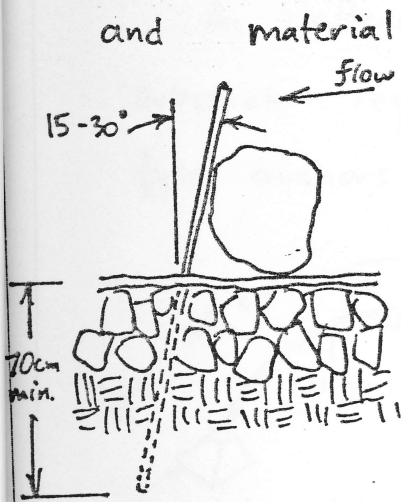
TYPE A : Continuous Weir

Anchored rocks are specified because seasonal river flow increases will transport unanchored substrate.

In general, continuous weirs consist of the structure shown below.



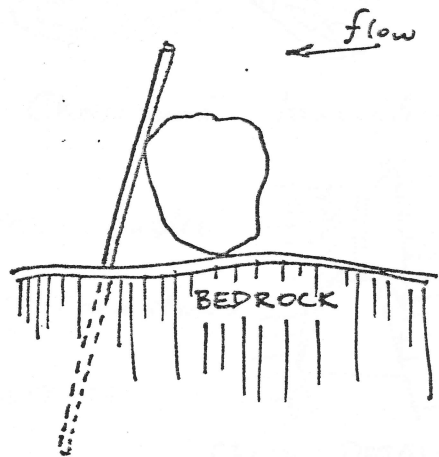
A variety of anchoring methods is presented so that environmental conditions



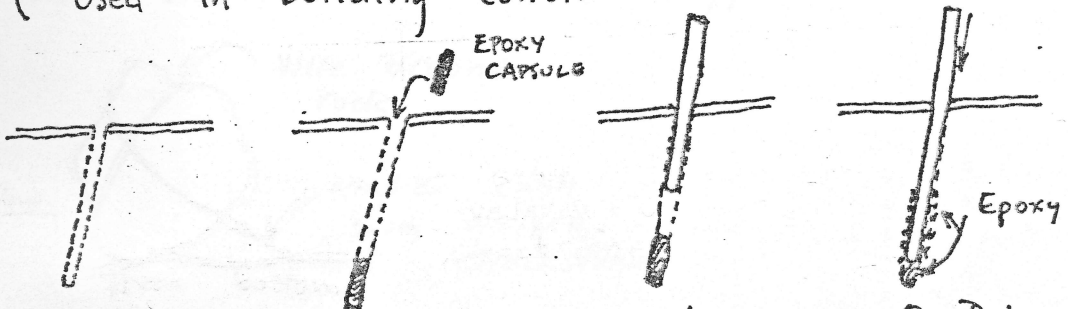
and material availability are accounted for. Concrete reinforcing rod, 20 mm dia. or greater, driven 70 cm or until solid and immovable. Anchor works in hard-packed rock and gravel substrate.

Where bedrock anchors are needed, a hole may be power-drilled.

The rod is either pounded into the under-size diameter hole or is set with mortar or a concrete epoxy capsule.*



(* Used in building construction. Use illustrated:)



① Hole drilled in rock.

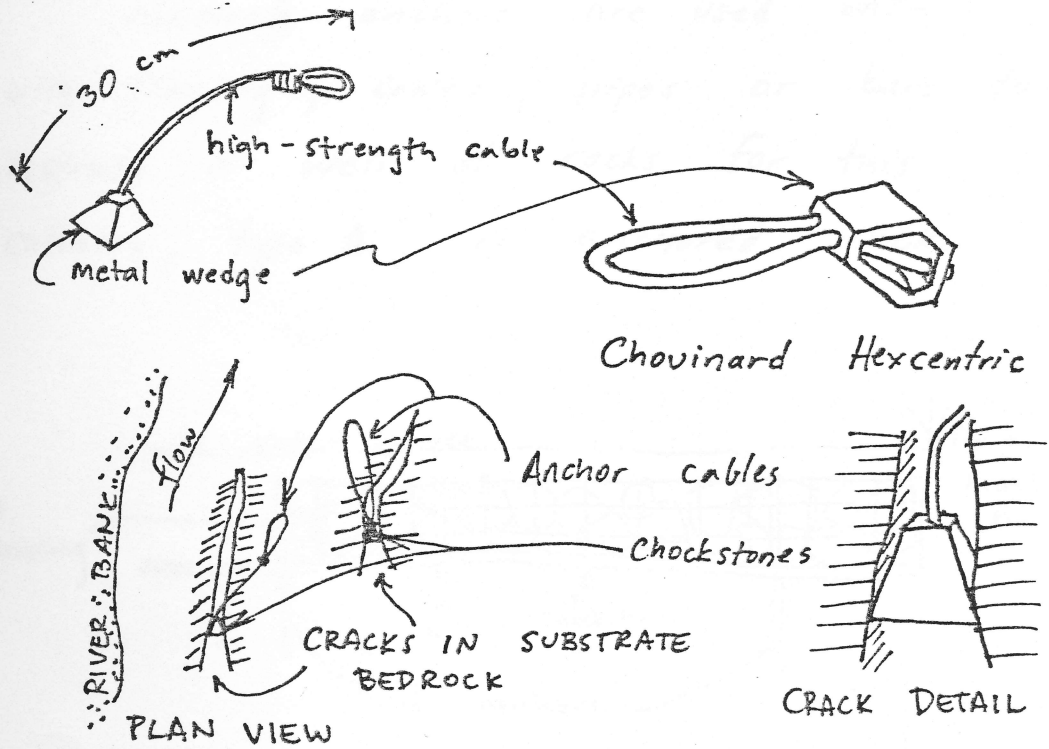
② Place glass epoxy capsule in hole.

③ Insert anchor rod in hole.

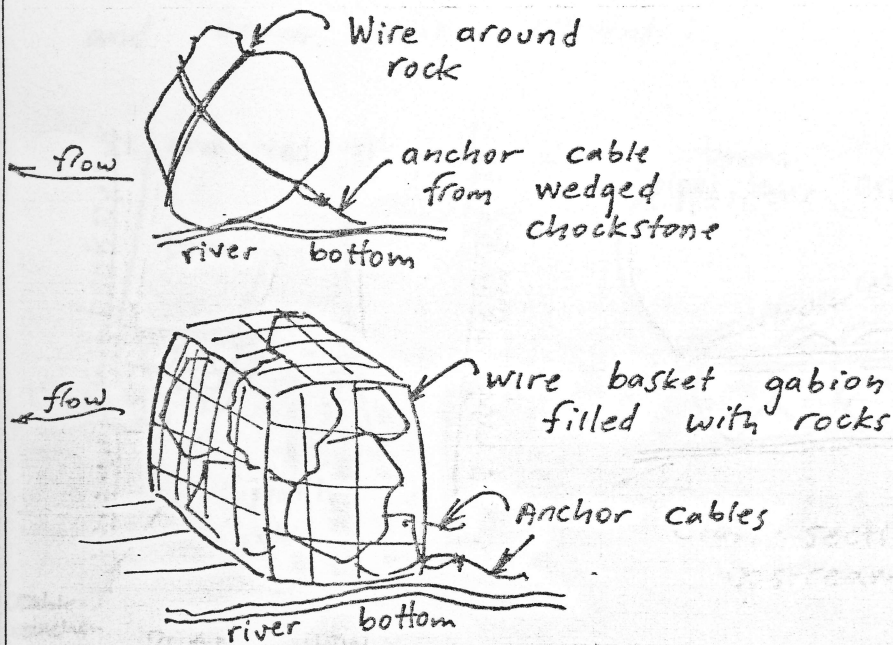
④ Drive anchor rod into epoxy capsule. Epoxy fills hole and anchors rod.

For rock drilling equipment in Hösavík, consult with the city engineer's office.

An alternative anchoring system for bedrock substrate requires mountain climber's chock stone type anchors or similar.

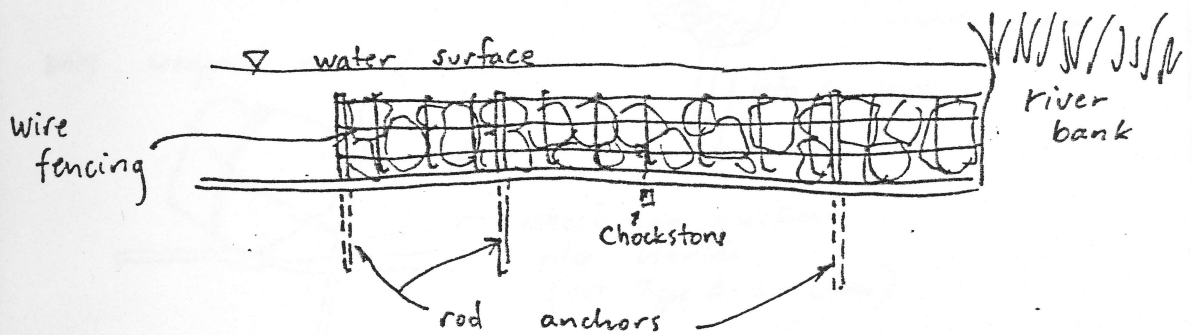


Anchor cables are attached to a connected-weir structure or wire-wrapped rocks.



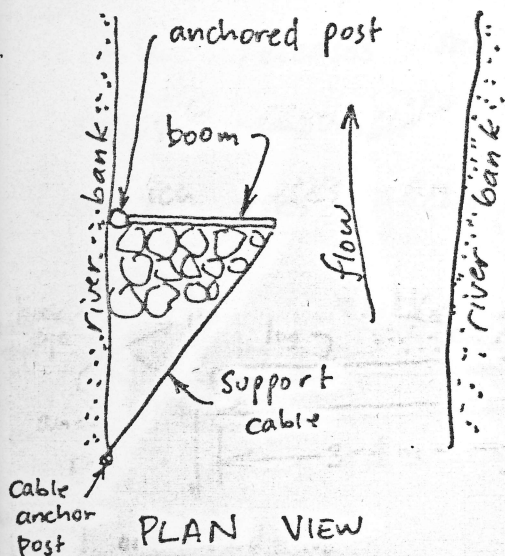
Chockstone anchors should be placed at 50 cm intervals or used in conjunction with rod anchors.

Substrate anchors are used with wire fencing, cables, pipes or bars to restrain a weir of rocks for this category, type A, of anchored rocks.

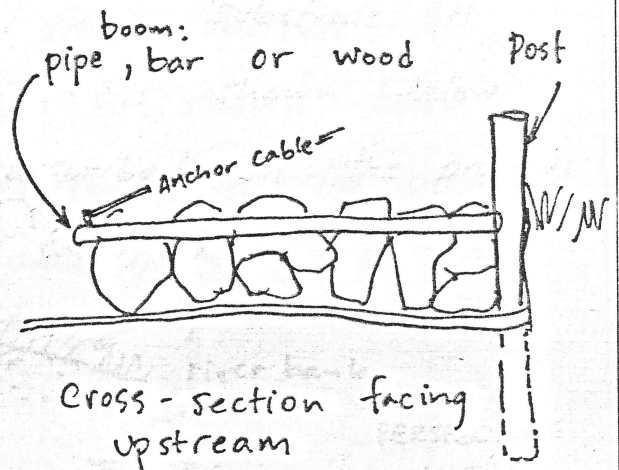


Cross - Section facing upstream

Anchored weir using bank anchors only and boom weir restraint :

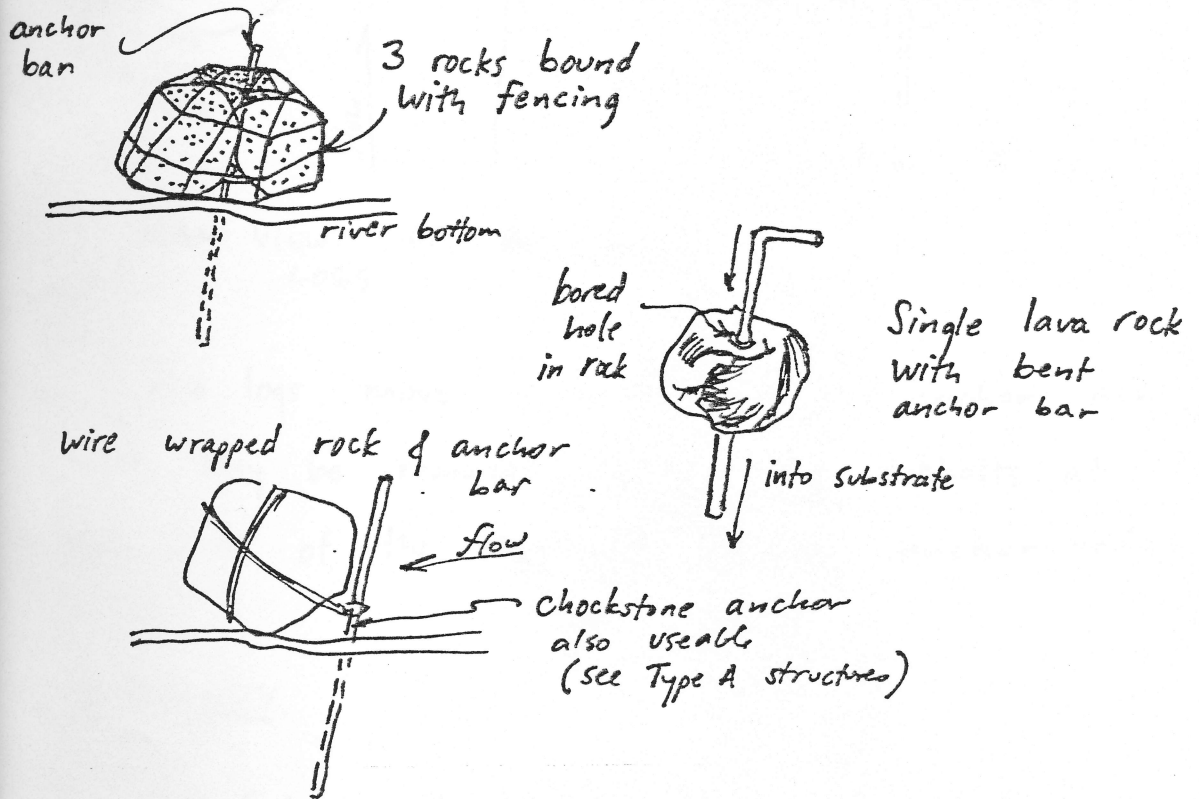


PLAN VIEW



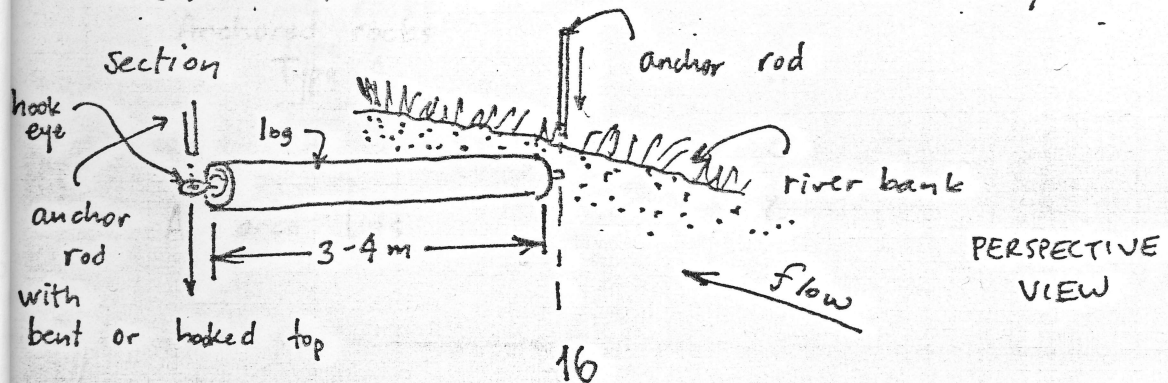
TYPE B: Individual Rocks

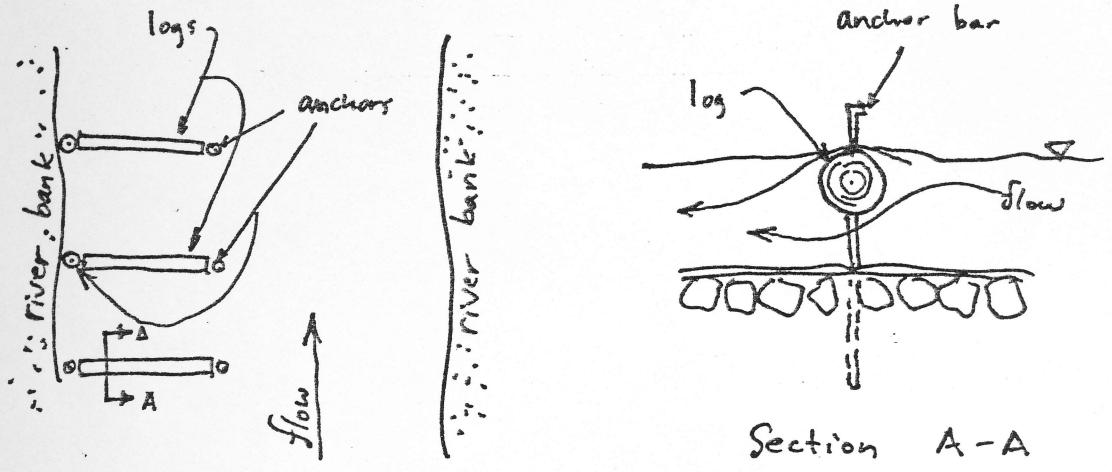
Single or small groupings of rocks are anchored using techniques illustrated below.



ANCHORED LOGS

Logs are used to generate flow turbulence which releases sediment from substrate. A simple removable design is shown below which uses anchors described in the previous





PLAN VIEW OF ANCHORED LOGS

The logs move vertically on their anchor bars and may be removed by lifting eyebolts at the ends of the logs off of the anchor rods.

SUMMARY

The following habitat improvements are recommended as the result of a field survey of Laxá i Aðal dal during the summer of 1986.

| Type of habitat | Number of sites |
|-----------------|-----------------|
| Loose Rock | 14 |
| Anchored rocks | |
| Type A | 4 |
| Type B | 5 |
| Anchored logs | 6 |