Government of the People's Republic of Bangladesh
Bangladesh Water Development Board
Water Resources Planning Organization

FLOOD ACTION PLAN

NORTHEAST REGIONAL WATER MANAGEMENT PROJECT (FAP 6)

KALNI-KUSHIYARA RIVER MANAGEMENT PROJECT FEASIBILITY STUDY

ANNEX H
FISHERIES

Final Report
March 1998

SNC ♦ Lavalin International
Northwest Hydraulic Consultants

in association with

Engineering and Planning Consultants Ltd.
Bangladesh Engineering and Technological Services

Canadian International Development Agency

2

COVER PHOTO: A typical village in the deeply flooded area of the Northeast Region. The earthen village platform is created to keep the houses above water during the flood season which lasts for five to seven months of the year. The platform is threatened by erosion from wave action; bamboo fencing is used as bank protection but often proves ineffective. The single *hijal* tree in front of the village is all that remains of the past lowland forest. The houses on the platform are squeezed together leaving no space for courtyards, gardens or livestock. Water surrounding the platform is used as a source of drinking water and for waste disposal by the hanging latrines. Life in these crowded villages can become very stressful especially for the women, because of the isolation during the flood season. The only form of transport from the village is by small country boats seen in the picture. The Northeast Regional Water Management Plan aims to improve the quality of life for these people.

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ACRONYMS AND ABBREVIATIONS

AFI	Ajmiriganj Fish Industries Ltd.
BFDC	Bangladesh Fisheries Development Corporation
BFRSS	Bangladesh Fisheries Resources Survey System
BWDB	Bangladesh Water Development Board
CIDA	Canadian International Development Agency
cm	centimetre
CPUE	Catch Per Unit of Effort
DFO	District Fisheries Officer
DOF	Department of Fisheries
FA	Fisheries Association
FES	Fishing Effort Survey
FPCO	Flood Plan Coordination Organization
FRI	Fisheries Research Institute
FW	Future With Project
FWO	Future Without Project
GOB	Government of Bangladesh
ha	hectare
KCS	Kuliarchar Cold Storage Ltd.
kg	kilogram
KKRMP	Kalni-Kushiyara River Management Project
km	kilometer
LDB	Laminated Duplex Board
m	meter
mm	millimetre
Mm^3	million cubic meters
MOFL	Ministry of Fisheries and Livestock
MOL	Ministry of Land
mt	metric tonne
NERP	Northeast Regional Water Management Project
NFMP	New Fisheries Management Policy
PWD	Public Works Department
t	metric tonnes
TFO	Thana Fisheries Officer
Tk	Taka (Bangladesh currency. $1 CDN=approx. Tk 30)

GLOSSARY

arat	Wholesale fish market
bachari	Small fishing boat
bana	Fish fence
barman	Hindu sub-caste whose major profession is fishing
beel	Floodplain lake, which may hold water permanently or dry up during the winter season
ber jal	A kind of seine net
bhasha	One type of fishing method
boromaach	Large fish species
borshi	Fishing hook
bundh	earthen dam closure
chai	Fishing trap
changari	Platform, especially made to dry fish
chotomaach	Small fish species
current jal	Net made of monofilament fibre
dhala	Breach in the river bank
duar	Deep scour hole in river
gele	Fisherman
haat	big market
haor	Depression on floodplain located between two or more rivers, which functions as a small internal drainage basin
jailla	fisherman
jal	fishing net
jalmohal	segment of a river for fisheries
jhaki jal	Cast net
kaiborta	Hindu sub-caste whose major profession is fishing
katha	unit of land measurement, equivalent to 0.08 acre
katha	brush park type fish production system
khal	channel
khancha	cage
khas	government owned land or water bodies
khola	Temporary dry season fishing camp
koch	Fishing harpoon
kona jal	A kind of seine net
maimol	Muslims whose major profession is fishing.
malo	Hindu sub-caste whose major profession is fishing
mother fishery	An area of with a dense concentration of diverse high quality fishery habitats which controls fish abundance over a much larger area
nadi	river
nikari	Fish retailer
rajbongshi	Hindu sub-caste whose major profession is fishing
shidol	one type of dry fish
shutki	dry fish
sip	Fishing hook

taka (tk)	unit of currency, 1 US $ = 40 taka (approx.)
thana	geo-administrative unit under a district comprising several unions
thella jal	Push net
ujaiya	Movement of fish against water current
union	geo-administrative unit under a thana comprising several villages
union parishad	elected local government council at the union level
wet season	7 months: May-November inclusive
zamindar	Feudal landlord

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The Kalni-Kushiyara River Management Project (KKRMP) project area, as shown in Figure H.1, is one of the richest inland fishing grounds of Bangladesh. It is crossed by the largest tributary of the Upper Meghna River - the Kalni-Kushiyara mainstream channel. The project area is flanked by two mother fisheries: Hakaluki Haor in the upper zone and Khaliajuri in the middle zone. A third partially rehabilitated mother fishery (Kawadighi Haor) lies adjacent to the Kushiyara channel, a short distance downstream from Hakaluki Haor.

The fishery resources of the project area are impressive. Stocks of the important herring food fish species *ilish* and the high value exportable prawn *golda chingri* migrate into the project for reproduction and/or grow-out. The occurrence of numerous other large and small species presents an important source for local consumption and income generation for professional fish producers, processors and traders. A portion of the catch is exported and contributes foreign exchange revenue to the Bangladesh economy.

The proposed interventions in the project area are taking the form of loop cuts, river training, dredging and flood control (Figures H.2(a) and H.2(b)). A number of field and desk studies have been conducted to enable an assessment of impact resulting from the above interventions. One major constraint was found to be the siltation of critical overwintering habitats in the river *duars* and floodplain *beels*.

The results of the fisheries studies have been summarized in the main report of the KKRMP feasibility study.

2. METHODOLOGY

Nominal data on fish production was gathered from the Annual Fish Catch Statistics of Bangladesh reports, published by the Department of Fisheries

Corporate fish purchases, production and export data was obtained courtesy of the Directors of Ajmiriganj Fish Industries Ltd. (AFI) and Kuliarchar Cold Storage Ltd. (KCS).

Monthly catch assessment surveys were carried out by a team of NERP fisheries field staff at 20 sites within the project area (Figures H.3(a) and H.3(b)) from February 1995 to December 1996 to obtain information on fish stock abundance and fishing operations. The characteristics of each sampling site are summarized in Table H.1. Survey sites were divided into riverine habitats (mainstream channel, *duars*, distributaries) and floodplain habitats (floodplain, *beels*).

Questionnaires for the Monthly Fisheries Field Reports were designed, tested and revised by the NERP Fisheries Specialist.

Other information on fisheries and environmental site characteristics were collected outside the scope of the questionnaire by frequent field visits by the supervising fisheries biologist, which included interviewing various groups of people (fishers, fish traders, and others).

Frequent field visits were conducted to gather information on fishing effort. This included a direct census of the mode of operation of fishing gears, the number of days of operation of different fishing gears at different sites and during different seasons. The total and seasonal fishing effort for different gears at each site was estimated from the data collected on the basis of the number of days of operation per month.

Further data was collected to ascertain the number of local fisher groups, the number of fishers aggregated by gear type, the number of units of each gear type, the number of units of each fishing craft type, and the area (in ha) of fishing ground harvested by individual fishers.

A sample of fishers were questioned on total catch per day, catch species composition, gear type, mesh size, boat type, number of hauls per day, and elapsed time per haul. Sample size was based on the number of units of each gear type operated at a particular site

After an initial manual processing of the field data, it was computerized for ease of analysis. Production estimates were generated for each site for the various species.

3. FISHERIES ENVIRONMENTS

3.1 Natural Habitats

The project area is contained within the Upper Meghna River basin most of which has developed naturally as a gentle sloping floodplain. The project area is characterized by the presence of high quality fisheries habitats in the form of the Kalni-Kushiyara River mainstream channel. The channel contains important river *duars*, other active rivers (Baulai, Old Surma, Khowai), distributaries (open and closed), extensive floodplains, *beels* and ponds.

Summary data on the principal aquatic habitat types in the project area are presented in Table H.2 and Figure H.4.

Riverine habitats together constitute only 4.2% (12,030 ha) of all aquatic habitats. The Kalni-Kushiyara channel has a length of 172 km in the project area, and covers an area of 3,955 ha.

Some 72 *duars* are developed in the Kalni-Kushiyara channel (Table H.3 and Figures H.5(a) and H.5(b)), and these together constitute 6.8% of the area of the channel. *Duars* in the Kushiyara channel are more numerous and somewhat deeper than the *duars* in the Kalni channel. There are another 18 *duars* in the other rivers in the project area.

Floodplain habitats constitute 95.8% of all aquatic habitats (276,000 ha), with flood lands being the single largest category (260,200 ha).

Approximately 173 *beels* occur in the project area (Table H.4 and Figure H.6). Some 38.8% of the *beel* area concentrates within a 3 km wide strip along each bank of the Kalni-Kushiyara River between Fenchuganj and Kalma (Figures H.7 and H.8). Deposition of sediment "splays" due to over bank spills and breaches in the river banks within this zone contribute to the loss of valuable fisheries habitat. This adverse impact is more pronounced in the river reach between Markuli and Kalma. *Beels* along the Kalni channel have larger surface areas than those located along the Kushiyara channel (Figures H.7 and H.8). There are 47 major *beels* in the project area with surface areas over 50 ha (Table H.5).

3.2 Artificial Habitats

Ponds are excavated primarily for developing homesteads and for washing and bathing by the people of the project area. There are an estimated 29,400 ponds (Table H.6 and Figure H.9) in the project area covering 2,466 ha out of which nearly 25.2% are cultured and potentially another 32.6% could also be. In addition, 42.0% are derelict lying fallow and covered in most cases with water hyacinths. The pond fisheries are scattered in the project area (Figure H.9). The cultured ponds are generally larger and deeper than other ponds and are used for wild fish stock and fingerlings. They are mainly located in flood free areas. The culturable ponds are shallow and are often located in areas subject to flooding. The derelict ponds are in poor condition. The ponds are more intensively used during the dry season when water levels are low.

4. FISH PRODUCTION AND ABUNDANCE

4.1 Fisheries Resources and Exploitation

4.1.1 Fish Biodiversity

A total of 71 species of fish have been recorded from the project area (Table H.7). Important groups are major carp, other carps, large catfish, knifefish, *ilish,* prawns, small catfish, small cyprinids, and other small species. The small species such as *chanda, puti, tengra* and *mola* form the bulk of the catch and are used primarily for local consumption. Whereas large species such as *rui, kalibaush, boal, air, ilish* and the prawn *golda chingri* are commercially important at urban and export markets.

Several species that were formerly abundant (the carps *nandina* and *angrot,* the barb *sarputi,* the catfish *pangash*) are now rare or locally extinct. Sedimentation and over-exploitation, have probably in the last few decades become negative contributors to the local biodiversity.

4.1.2 Fishing Practices

The long tradition of fishing in the project area is an important determinant of fishing technology. Diverse fishing practices are used in the region's floodplain and *beels*. During the dry season when fish are confined to the *beels* and in the drainage channels, there is active fishing with a wide variety of fishing methods (Table H.8). The specifications depend on the type of habitat, target species, hydrological conditions, portability, labour intensity, capital costs, availability of materials and profitability. The intensity of fishing varies inversely with the amount of water retained in the depressions.

Fishing boats that are being used to operate the gear and transport fish also vary greatly in size, and are predominantly non-mechanized country boats using sail, paddle or pole propulsion.

4.1.3 Fishing Communities

The traditional fishers of the project area are Hindus distinguished easily by their titles. They are usually from the *Kaibarta, Barman, Das, Rajbongshi,* and *Malo* castes. They are predominantly landless or land poor people with a low standard of living. The women, due to restricted mobility, do not come out of the houses for fishing in open waters and are employed in fish processing and net making/repairing activities.

Three occupational categories of fisherman have been identified in the project area:

Professional fishers, who earn their livelihood entirely from fishing;

Part-time fishers, who fish for only part of the year to supplement their income, and are engaged in other employment during the rest of the year.

Occasional fishers, who fish irregularly, and mainly for subsistence rather than income.

Details of the fishers and their household, according to the above categories, in the project area can be found in Table H.9. 4.3

Fishers generally own the gear and boat either individually or as a group; labour wages are paid on a catch sharing basis. The distribution of catch, however, varies depending on the nature of the fishing effort and the water body type. 4.3

4.1.4 Fisheries Management

The open water fisheries of the project area are managed by the owners to generate income from fee paying fishers and fish traders. In the past, the ownership of the rivers, *beels* etc. rested with the private landlords. The rivers are divided into arbitrary segments each known as a fishery or *jalmohal*. Similarly each seasonal or perennial *beel* is also a fishery or *jalmohal*. Currently the Ministry of Land (MOL) owns all the fisheries. The Ministry of Land lease the fisheries by auctioning through the local Revenue Offices for a period of one to seven years. This is not the case for running rivers which are declared open since 1996.

The basic mechanism for managing fishery resources in the open waters of the project area has been based on allocation of fishing rights through periodic leasing. Although a licensing system, the New Fisheries Management Policy was introduced in selected fisheries in the project area, the traditional leasing system is still the dominant management mechanism. Under this traditional management system, fishers get fishing access by paying to the leaseholders.

The revenue oriented management system has caused numerous problems. The system tends to encourage over fishing of stocks as both fishers and leaseholders are motivated by the desire to maximize profit. The leaseholders, during the lease tenure, exercise a monopoly of privileges to control and exploit the actual fishers. They not only charge exorbitant rents or fees for different fishing gear and units belonging to fishers but also take the bigger share of the catch. Thus the role of lessees in the management of fisheries of the project area is exploitative and actual fishers working in the fishing grounds remain deprived and perpetually poor.

4.2 Nominal Fish Production Data

The fisheries in the project area form an important economic activity whilst providing a means of subsistence.

The Department of Fisheries (DOF) operates a fisheries statistics data collection system (BFRSS) which generates production estimates for various water bodies and water body categories. Several of the DOF catch assessment sampling stations are located within the project area. BFRSS fish production data for the Upper Meghna River covers the project area.

Total catch data over a 10 year period is presented by district in Table H.10 and Figures H.10 and H.11. Although some of the data series are incomplete, the general trend in the project area is that river fisheries have undergone a decline since reaching a peak in 1988/89. Production from the Kalni-Kushiyara channel (presented as the Upper Meghna River in DOF annual fish catch statistics reports) peaked at about 9,600 tonnes (t) in 1988/89, and then declined to about 3,500 tonnes by 1992/93. Catches in the lower portion of the river (Comilla and Mymensingh districts) account for the greater part of production. Almost all species groups and individual species show a similar pattern to the overall trend (Tables H.11 to H.18 and Figures H.12 to H.14).

4.3 Corporate Fish Production Data

Two processing plants operating in the project area provided the source for fish purchase data as well as ancillary data on exports of fish products.

4.3.1 Ajmiriganj Fish Industries Ltd. (AFI)

The company operated a substantial fish processing plant at Ajmiriganj from 1979 to 1993. The plant closed due to financial problems. The following information was obtained courtesy of the company management.

The capacities of plant equipment are as follows:

- Plate freezer: 2 t/day
- Air blast freezer: 2 t/day
- Block ice plant: 10 t/day
- Cold storage: 150 t (in two rooms)

Of the total supply of raw material, 55% was harvested from their own leased fisheries (for example the Khaliajuri Fishery), 15% purchased from the open water fishers in the Khaliajuri and Ajmiriganj areas and 30% purchased from fishers in the Sylhet area. These proportions are approximate and vary from year to year. It was stated that the plant could handle only 15% of the area's total production (Khaliajuri, Ajmiriganj, Sullah, Derai and Baniachang *thanas*). The plant required quality fish (usually the larger size of a particular species) which were checked before purchase.

Data on fish purchases during a seven year period (1985 to 1991) are presented in Table H.19 and Figures H.15 to H.21. Total annual purchases of finfish and prawns were generally within the range of 260 to 360 tonnes during the period, except for a sharp peak of almost 580 tonnes in 1988. The peak was probably due to extensive flooding that year. Though there were periodic fluctuations, generally prawn purchases increased from 140 tonnes to about 200 tonnes. Finfish purchases were fairly stable from 1985 to 1987 in the 180-190 tonnes range. Purchases in 1988 rose sharply to a peak of over 380 tonnes and then declined in subsequent years to about 130 tonnes in 1991. Trends for finfish groups and individual species show a peak for high value large species (catfish, major carp, *chitol*, snakehead) in 1988, and a subsequent decline. Lower value small species (catfish, other species) have a minor share of total purchases during the beginning and middle of the period, but become increasingly important until, in 1991, they are almost equal in quantity share to large finfish.

An important exported species is *golda chingri*. The floodplains of Khaliajuri, Ajmiriganj, Sullah, and Itna serve as grazing grounds for the giant fresh water prawn during the monsoon period. Pangasiar Haor of Khaliajuri is one of the important fish and shrimp producing areas in the region. Most of the renowned *jalmohals* of the Khaliajuri fishery are located within that *haor*, of which Rangchapur, Dhalimati, Chunai and Faridpurar Duar are the most important. *Golda chingri* are caught in the floodplain between May and September. In addition, a few prawns are also caught from *duars* and *kathas* during the period of winter fish harvesting. Up to 200 fishing units work on that floodplain (around the Laipsa Bazar area) to catch prawn. Each fishing unit consists of 150-200 *chai* (basket traps). One fishing unit can catch up to 65 kg of prawns in a season, but the average catch, based upon 1992 data for 11 units is 52 kg which suggests that

some 9000 kg of prawns were harvested from the Pangasiar *Haor* floodplain (Laipsa area) in 1992. Rough economics of these *chai* operations is provided below:

- Cost of *chai*: 175 *chai* units at Tk 25/*chai* = Tk 4,375/fishing unit
- Cost of bamboo sticks: Tk 350
- Total costs: Tk 4,725/fishing unit
- Sale of the product: at Tk 175/kg x 52 kg = Tk 9,100/fishing unit

Prawns are exported to USA, Japan, Canada, UK, Italy, France, Belgium, Germany and other western markets. Freshwater fish (such as *Rui, Boal*) go mainly to the UK. There is very good demand in the UK from the Bangladeshi community.

Despite good market demand, finfish exports have declined (Tables H.20 and H.21, and Figure H.22). The decline in exports of freshwater fish is due to a decline of fish production in the present area. In 1992, there was very little water in the *haor* areas. Normally water levels are about 4.5 to 5.0 m, but in 1992 the level was only 1.0 to 1.3 m.

Aside from a shortage in fish, another problem affecting fish exporters is that internationally standard packing material (laminated duplex board, LDB) is not available in Bangladesh. The locally produced packing material (simple printed and waxed duplex board) is of very poor quality. If the product was better packed it would get a better price. It would be too expensive to produce LDB locally because of the high price of the machinery. High duties are imposed on imported equipment and supplies (plastic fish boxes, rubber gloves, etc.). Locally produced items do not meet international standards. Sea freight costs from Bangladesh are high. A 40 ft container with destination London or New York costs US$6,000. Out of Bangkok the same container costs only US$3,000. Export of fresh (chilled) fish on ice would be interesting, but the cost of air freight (Tk 50 per kg) is too high.

The Export Promotion Bureau does not have sufficient information about the international fish market. Bangladesh has to compete with India, the Philippines, Thailand and Malaysia in the prawn market. The price of finfish exported from Bangladesh is too high compared to regional competitors. Bangladesh *magur* is priced at £1.20 per lb., while Thailand sells it at only £0.65 per lb. A UK importer will buy from India because the fish are cheaper than from Bangladesh. India sells *Rui* at Rs 45 per kg (equivalent to Tk 60). However, AFI has to purchase *Rui* at Tk 50 per kg from the fishers for a fish weighing 3 kg or more. As a result, AFI is currently exporting at a loss. AFI are operating just to remain in the market and predict that over the next two years Bangladesh will probably get squeezed out of it. About 60% of all *ilish* caught in Bangladesh is exported (mostly smuggled) to India. *Ilish* caught near Chandpur exits the country via Comilla. This aggravates the supply shortage and dietary protein deficiency. The high domestic fish price is due to declining production. Many species such as *chirka baim, rani, bheda, sarputi, nandina, mohashol,* and *gutum* are either in short supply or locally extinct.

In recent years, loading of transport boats at Ajmiriganj has been quite difficult as the AFI plant is now 1 km from the river because of sedimentation. The containers warmed up while being carried from the plant to the river. The river itself is very shallow in places and this has reduced considerably the allowable draft of transport boats. While the boats should carry up to 30 tonnes of cargo, they now carry only 2 tonnes. In 1979-80 when the factory was built, the water depth was 13-15 m in front of the factory (because there was a *duar* there), and by 1984-85 the plant was receiving 15-18 tonnes of raw material per day during the dry season (January to March).

Only country boats can pass there now and consequently, river excavation is badly needed in the area. The carrying cost to Chittagong (where the containers are transhipped) is now higher than the product value. In addition, the fish bought at Ajmiriganj is sometimes tainted by pollution from Chhatak and Fenchuganj. Fish from the Surma all the way down to Khaliajuri have a bad smell. Species affected are *boal, air, rui* and *chitol.* Kushiyara fish as far downstream as Sherpur have also been effected by the Fenchuganj fertilizer plant effluent.

Because of the shortage of fish supply in Bangladesh and high domestic prices, it is more lucrative to import cheap fish from outside. But the 70% customs tariff, a protective tariff designed to support Bangladesh Fisheries Development Corporation fishing operations and marketing is preventing fish imports from expanding. Over the next 3 to 5 years, AFI predicts that Bangladesh will have to start importing fish from India to meet food requirements. Bangladeshis, however, do not like frozen fish, although, Bangladeshis in the UK and elsewhere are quite prepared to pay high price for frozen fish from Bangladesh.

4.3.2 Kuliarchar Cold Storage Ltd.

The plant, established in 1985, is located on a 0.8 ha plot at Kuliarchar. The initial investment was Tk 7.4 million and it currently at Tk 100 million, the capital being supplied through bank loans. The company employs 10 executive and management officers and a staff of 300 permanent and 100 part-time workers with women making up about 55% of the work force. The company was awarded the Motshopakkho Prize in 1996 by the Prime Minister for excellence in business.

The fish originates from Ajmiriganj, Sullah, Sunamganj, Derai, Khaliajuri, Itna, Baniachang, Lakhai, Mitamain, Astagram, Nikli and Mohanganj. Some of these supply sources are outside the project area, and it was not possible to establish what fraction of the total fish supply originated from within the project area. Fish is purchased by the plant from 30 permanent suppliers. Three insulated vans of 7 tonnes capacity each transport fish to the plant and the finished product to shipping depots.

The peak season for prawns is late May to early November, and November to February for table fish. Purchasing prices are Tk 270-594 per kg of headless prawns, and Tk 80-135 per kg of dressed table fish. Prawns originate from Bajitpur, Bhairab, Astagram, Nikli, Itna, Khaliajuri and Kuliarchar. A total of 3,371 kg of headless prawns were purchased in 1992.

The maximum production capacity is 11,220 kg per day, but on average 4,000-6,000 kg of processed fish and prawns are produced. Ice production is 11,220 kg/day of block ice (equivalent to 144 blocks) and 2,000 kg per day of flake ice. The capacity of the cold store is 300 tonnes.

Export products are marketed under the brand name JC. The major export items are prawns (65%) and table fish (35%). Export prices for prawns are US$ 8.00-8.50 per lb and for table fish US$ 0.75-0.95 per lb. Processed fishery products are exported to Belgium, Germany, Italy, UK, USA and the Netherlands.

Data on finfish and prawn exports for a 10 year period (1986 to 1995) are presented in Table H.22 and Figure H.23. Both groups show a consistent increasing trend, reaching 632 tonnes of prawns and 2,034.5 tonnes of finfish in 1995. As an unknown portion of the fish originates from outside the project area the data can only be interpreted as indicative.

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4.4 NERP Catch Assessment Survey

4.4.1 Description of Survey Sites

In total, 20 sites were sampled. Their list is presented in Table H.1. Characteristics common to these sites relate to water quality, and turbidity and siltation.

Water quality: At all sites except the Kushiyara River mainstream channel (107, the rate of dissolved ammonia and carbon dioxide was found to be very high. The amount of oxygen, hardness and pH were also found to be less than the required amount, resulting in a low level of fish production. On the Kushiyara River sampling site, dissolved ammonia and carbon dioxide was found to be normal to occasionally high. Dissolved oxygen, hardness and pH were normal for all aquatic organisms. Water quality testing was not performed on the Sinai River (106) site.

Turbidity and siltation: Water turbidity was very high at all sites, resulting in heavy siltation of rivers, *haors* and *beels*.

Following is a description of individual sites.

Kushiyara River, mainstream channel (107)
Description: The Kushiyara is the main river of the Northeast region. It flows from the hills of the Upper Sylhet area to Markuli where it becomes the Kalni River. The sampling site selected by NERP extends from Kashimpur to Sherpur - a distance of 7 km. The sampling site covers an area of 140 ha and include several *duars*.

Fish fauna:
Large species: *boal, catla, kalibaush, chitol, air, rita, ilish.*
Small species: *tengra, gulsha, pabda, bacha, puti, garua, baim, icha, lachu, batashi, baspata, bailla, chanda, mola, chela, chapila.*
Production sampling data is presented in Table H.23 and Figure H.24.

Fishing gear: There are various type of fishing gear in use at the site, including *ber, jhaki, vata, current, uther, veshal, shangla, deol, borshi, thella*, hand fishing, *ilish, tana borshi, horga, hazari borshi.*

Fishing craft: *dingi, bachari, kusha*, joint *dingi, haldar.*

Fish disease: None was reported for riverine fish.

Kalni River, mainstream channel (100, 101 & 104)
Description: the Kushiyara River becomes the Kalni River at Markuli. The Kalni flows, along with a number of distributaries, from Markuli to Dilalpur (15 km upstream of Bhairab Bazar) where it becomes the Upper Meghna . A number of *duars* are present in this river which is a main migratory route for fish. The route crosses the *thanas* of Ajmiriganj, Baniachang, Itna, Mitamain, Astagram, Khaliajuri, Sullah and Lakhai. Originally several rivers including the Old Surma and the Bheramohona used to flow into the Kalni. As a result, an important migratory route existed between the Kalni and the Surma. However, the construction of two closures, one on the Kalni left bank at Markuli and the second on the Bheramohona interrupted this migratory

route causing an alteration in both migration pattern and biodiversity. From Markuli to Madna three sections of the Kalni were selected for the fisheries study: the first from Markuli to Saudersiri (100): the second from Badalpur to Ajmiriganj (101): and the last from Ajmiriganj to Katkhal (104).

Fish fauna:
Large Species: *boal, catla, kalibaush, rui, mrigel, chitol, air, rita, ilish.*
Small Species: *tengra, gulsha, pabda, bacha, puti, gaura, baim, icha, lachu, batasi, baspata, bailla, chanda, moa, chela, chapila.*

Production sampling data is presented in Tables H.24 to H.26, and Figures H.25 to H.27.

Fishing gear: *ber, jhaki, vata, current, uther, veshal, shangla, deol, borshi, thella*, hand fishing, *ilish, sip, katha, koch,* traps.

Fishing craft: *dingi, bachari, kusha*, raft.

Fish disease: An outbreak occurred between the last week of September 1995 and mid-March 1996 and it was particularly severe between November and January. The species mostly affected were *baim, gochi, tengra, puti, gulsha, gozar, air, lachu.*

Gudimukh Duar (121)
Description: there are several *duars* in the river between Markuli and Madna. Three of these Gudimukh, Mahtabpur and Shahebnagar Duar have been selected as sampling sites for the KKRMP feasibility study. The first, Gudimukh Duar is located in front of Ajmiriganj *ghat*. It covers a 9 ha area and the maximum depth was recorded as 12 m in May 1996.

Fish fauna:
Large Species: *boal, rui, air, carpio, ilish, gozar, rita, ilish, kalibaush.*
Small Species: *tengra, puti, gulsha, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, dhela, chela, chapila, khosolla, gochi, baim, foli, veda.*
Production sampling data is presented in Table H.27 and Figure H.28.

Fishing gear: *ber, jhaki, current, shangla, vata, koch, thella, sip, ichar chai.*

Fishing craft: *dingi, bachari, kusha*, raft.

Fish disease: An outbreak occurred between last week of September 1995 and mid-March 1996. It was particularly severe between November and January . Species mostly effected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Mahtabpur Duar (122)
Description: Mahtabpur Duar is located near Shantipur village and below Kakailseo. It covers a 10 ha area and the maximum depth was 12 m in May 1996. According to the local community, it once was one of the deepest *duars* in the area but it is gradually silting up causing a decline in the fish population.

Fish fauna:
Large Species: *boal, rui, carpio, rita, chitol, air, catla, baghair, kalibaush.*
Small Species: *tengra, gulsha, bacha, baluchata, puti, chela, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, dhela, poa, chapila, kaskauri, gochi, baim, foli, checa.*
Production sampling data is presented in Table H.28 and Figure H.29.

Fishing gear: *jhaki, vata, ber, current, shangla, borshi, uther.*

Fishing craft: *dingi, bachari, kusha.*

Fish disease: An outbreak occurred from the last week of September to mid-March. Species mostly affected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Shahebnagar Duar (123)
Description: This *duar* is located downstream of Katkhal Bazar where the Senai River joins the Kalni-Kushiyara. Fish from the Kalni, Senai, Surma-Baulai and adjacent *beels*, *haors* and floodplains take shelter in this *duar*. It covers a 14 ha area and the maximum depth was 14 m in May 1996.

Fish fauna:
Large Species: *boal, rui, carpio, rita, chitol, air, catla, baghair, kalibaush.*
Small Species: *tengra, gulsha, bacha, baluchata, puti, chela, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, dhela, poa, chapila, kaskauri, gochi, baim, foli, checa.*
Production sampling data is presented in Table H.29 and Figure H.30.

Fishing gear: *jhaki, vata, ber, current, shangla, borshi, uther.*

Fishing craft: *haldar, dingi, bachari, kusha.*

Fish disease: An outbreak occurred between the last week of September 1995 and mid-March 1996. Species mostly affected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Kalni River, open river (105)
Description: The sampling site stretches from Derai to Dalbazar, a 4 km long reach. Motorized boats pollute the water and the local community believes that this has caused large fish to move out of the area.

Fish fauna:
Large Species: *boal, rui, air, ilish, kalibaush.*
Small Species: *tengra, puti, cella, gulsha, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, dhela, poa, chapila, kaskauri, khosolla, gochi, baim, foli, veda, checa.*
Production sampling data is presented in Table H.30 and Figure H.31.

Fishing gear: *ber, jhaki, current, shangla, veshal, sip, ichar chai.*

Fishing craft: *dingi, bachari.*

Fish disease: An outbreak occurred between the last week of November 1995 and mid-February 1996. Species mostly affected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Sinai River, open river (106)
Description: The Sinai River joins the Kalni at Kadamchal, downstream of Katkhal. The survey area extend from Kadamchal to Islampur, a 3 km long reach. The river outfall is often dry during the dry season but stagnant water remains in the reach located upstream of the outfall.

Fish fauna:
Large Species: *air, boal, chitol, rui.*
Small species: *garua, chapila, gulsha, icha, chela, puti, batashi, bheda, taki, shole, koi, shing, chanda, tengra.*
Production sampling data is presented in Table H.31 and Figure H.32.

Fishing gear: *uther, ber, jhaki, thella, current,* hand fishing.

Fishing craft: *dingi*

Fish disease: No diseased fish were found in this sampling site.

Kalni River, closed river (130)
Description: This distributary has been cut off from the Kalni by the Markuli closure. The reach considered for the sampling site is located between Dalbazar and the closure. Before the construction of the closure in 1978 this stream was a migratory route. The closure was constructed to limit damage to crops, cattle and houses during pre-monsoon floods.

Fish fauna:
Large Species: *boal, rui, ilish, kalibaush.*
Small Species: *tengra, puti, cella, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, dhela, poa, chapila, kaskauri, gochi, baim, foli, checa.*
Production sampling data is presented in Table H.32 and Figure H.33.

Fishing gear: *jhaki, current, thella, sip.*

Fishing craft: *dingi, bachari,* raft.

Fish disease: An outbreak occurred between the last week of September 1995 and mid-March 1996. It was particularly severe between November and January. Species mostly effected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Old Kushiyara River, closed river (131)
Description: The Old Kushiyara River is the former course of the Kalni-Kushiyara River, now abandoned. It consist of several channels known as Kodalia Fisheries and connected to the current Kalni channel by the Koyer Dhala. This water body plays a major role for agriculture as well as fisheries in Ajmiriganj, Baniachang and Nabiganj Thana. In the past, when the channel was active, severe early flooding used to occur, damaging crops and houses. The channel was deep and provided a good habitat for fish. However, to limit flood damage, a closure was

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constructed on the Koyer Dhala in 1987 which isolated the Kodalia water body, closed the migratory route and caused a decline in the fish population.

This site is a perennial water body which covers 60 ha and has a maximum depth of 8 to 10 m during the monsoon. In 1995, the Koyer Dhala closure breached during a pre-monsoon flood and the local community observed an important fish migration from the Kalni into the Kodalia Fisheries.

Fish fauna:
Large Species: *boal, rui, catla, air, carpio, ilish, gozar.*
Small Species: *tengra, puti, gulsha, batasi, baspata, pabda, gaura, icha, lachu, bailla, taki, moa, chanda, chela, chapila, koi, khosolla, gochi, baim, foli, phasa, veda.*
Production sampling data is presented in Table H.33 and Figure H.34.

Fishing gear: *ber, jhaki, current, vata, sip, thella,* hand fishing, *borshi, koch, ichar chai*

Fishing craft: *dingi, bachari*, raft.

Fish disease: An outbreak occurred between the last week of September 1995 and mid-March 1996. It was particularly severe between November and January. Species mostly affected were *veda, taki, baim, gochi, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Kumarpara Floodplain (114)
Description: The floodplain is located south of Kumarpara village in Ajmiriganj Thana and about 400 m east of the Kushiyara River. Water enters into the floodplain every year from mid-June to late July when the Kushiyara River overflows. The floodplain remains flooded until the first week of November. Depth of water ranges from 1.5-2.5 m during the monsoon. There are no fishing restrictions in this floodplain during the monsoon season.

Fish fauna:
Large Species: *boal, gonia, rita, ilish.*
Small Species: *pabda, bailla, taki, chanda, puti, chela, mola, gochi, kaikka, chapila.*
Production sampling data is presented in Table H.34 and Figure H.35. *Golda chingri* was abundant in this flood plain during 1996 monsoon season.

Fishing gear: *ichar chai, tana borshi, thella, ilish, deol.*

Fishing craft: *dingi, kusha.*

Fish disease: None was reported.

Gazaria (PU1)
Description: This is a 6 ha area with 14 small ponds and several ditches which is now part of the platform constructed in 1996 with dredging spoils. The ponds were mainly used for bathing and washing clothes and fish culture was not practiced. Fish entered the ditches when the river level rose at the beginning of the monsoon.

Fish fauna:
Large Species: *boal, rui, carpio, kalibaush.*
Small Species: *tengra, puti, chela, icha, bailla, taki, moa, chanda, darkina, shol, koi, kholisha.*
Production sampling data is presented in Table H.35 and Figure H.36.

Fishing gear: *jhaki, current, sip,* hand fishing.

Fish disease: An outbreak occurred between the first week of October 1995 and February 1996. Species mostly affected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, lachu.*

Shahnagar (PU2)
Description: The site covers an area of 6 ha and later enters through two ditches. The site remains flooded for 3-4 months during the monsoon season. Fishing is restricted to this season alone. During the dry season the area is used for cultivating rice.

Fish fauna:
Small Species: *tengra, gulsha, puti, chela, icha, taki, gochi, chanda, baim.*
Production sampling data is presented in Table H.36 and Figure H.37.

Fishing gear: *jhaki, current*

Fish disease: None was reported.

Kakailseo (PU4)
Description: This site is now located under the dredging platform built in 1996. There were 11 ponds in the depression and the total area was 3.3 ha. One pond was cultured.

Fish fauna:
Large Species: *rui, carpio, catla, kalibaush.*
Small Species*: tengra, puti, icha, bailla, taki, moa, chanda, darkina, gochi, shole, koi, kholisha.*
Production sampling data is presented in Table H.37 and Figure H.38.

Fishing gear: *jhaki, thella,* hand fishing, *sip.*

Fish disease: None was reported.

Katkhal (PU5)
Description: The site is a 5 ha low lying area with a single ditch and where only subsistence fishing is practised.

Fish fauna:
Small Species: *puti, icha, taki, tengra, gulsha, mola, pabda, lachu, gochi, baim.*
Production sampling data is presented in Table H.38 and Figure H.39.

Fishing gear*: thella, current,* hand fishing.

Fish disease: An outbreak occurred between the first week of October 1995 and February 1996. Species mostly affected were *taki, baim, puti, tengra, gulsha.*

Bheramohona beel (132)

Description: The Bheramohana Beel is currently connected to the Gudi River, a tributary of the Old Surma River, and to the Darain River. The *beel*, with an area of 232 ha was connected to the Kushiyara River through a migratory channel which was closed first in 1985 then again in 1992. As a result, the fish population of the *beel* has dropped considerably. The *beel* has also silted up. Its area has shrunk and the maximum depth has reduced from 25 to 10 m. Fishing in the *beel* is managed under lease. Usually the water enters the *beel* in May from the overflowing Kalni-Kushiyara and the area remains flooded until December.

Fish fauna:
Large Species: *boal, rui, air, carpio, ilish, gozar, rita, ilish, kalibaush.*
Small Species: *tengra, puti, gulsha, batasi, garua, baspata, pabda, icha, lachu, bailla, taki, moa, chanda, dhela, chela, chapila, foli, khosolla, gochi, baim, veda.*
Production sampling data is presented in Table H.39 and Figure H.40.

Fishing gear: *ber, jhaki, current, shangla, vata, koch, thella, sip, ichar chai.*

Fishing craft: *dingi, bachari, kusha,* raft.

Fish disease: An outbreak occurred between the last week of September 1995 and mid-March 1996. The outbreak was particularly severe between November and January. Main species affected were *veda, taki, baim, gochi, chela, puti, tengra, bailla, gulsha, air, gozar, lachu.*

Biddyakhola Beel (113)

Description: This is one of the shallowest *beel* of the study area. It is connected to the Kalni-Kushiyara through several distributaries. *Beel* area is about 12 ha, of which 1.5 ha is *khas* land. The depth reaches 4 m in the monsoon. The *beel* is embanked by an earthen road. Fishing is managed under lease and only selected fishers can fish all year round.

Fish fauna:
Large Species: *boal, rui, catla, air, carpio.*
Small Species: *tengra, puti, icha, lachu, bailla, taki, chanda, chela, chapila, koi.*
Production sampling data is presented in Table H.40 and Figure H.41.

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Fishing gear: *ber, jhaki, current, thella,* hand fishing, *sip, koch, ichar chai.*

Fishing craft: *dingi, bachari,* raft.

Fish disease: An outbreak occurred between the last week of September and mid-March. Severe outbreak occurred from November to January. Species mostly affected were *baim, gochi, tengra, puti, bailla, gulsha, gozar, air, lachu.*

Dhuiya Beel (112)

Description: This is a medium sized *beel* near the village of Wara. The total area of the *beel* is 29 ha and the maximum depth in the monsoon about 6 m. This *beel* is connected with the Kalni-Kushiyara by a narrow canal and is gradually silting up. Fishing is managed under lease. Leaseholders allow selected fishers to fish all year round. The main fishing months are April and December.

Fish fauna:
Large Species: *boal, rui, catla, air, carpio.*
Small Species: *tengra, bacha, puti, korsola, icha, lachu, bailla, taki, chanda, chela, chapila, koi, kaskauri.*
Production sampling data is presented in Table H.41 and Figure H.42.

Fishing gear: *ber, jhaki, current, koch, thella,* hand fishing, *katha, ichar chai.*

Fishing craft: *dingi, bachari.*

Fish disease: An outbreak occurred between the last week of September and mid-March. It was particularly severe between November and January. Species mostly affected were *baim, gochi, tengra, puti, bailla, gulsha, gozar, air, lachu.*

Barogop Beel (111)
Description: The Barogop is one of the largest *beels* in the area. B*eel* area is 514 ha and maximum depths range from 8-10 m. It is fed by the Kalni-Kushiyara. The water reaches its maximum in August, then begins to recede until November. Fishing is managed under lease.

Fish fauna:
Large Species: *boal, rui, catla, air, carpio.*
Small Species: *tengra, bacha, puti, korsola, icha, lachu, bailla, taki, chanda, chela, chapila, koi, kaskauri.*
Production sampling data is presented in Table H.42 and Figure H.43.

Fishing gear: *ber, jhaki, current, thella, koch*, hand fishing, *katha, ichar chai.*

Fishing craft: *dingi, bachari.*

Fish disease: An outbreak occurred between the last week of September and mid-March. It was particularly severe between November and January. Species mostly affected were *baim, gochi, tengra, puti, gulsha, gozar, air, lachu.*

4.4.2 Fish Catch and Species Composition Data

Total fish production in the project area is estimated at about 54,600 tonnes (Table H.43). The breakdown by habitat (Table H.44 and Figure H.44) indicates that 76.2% of all fish production originates from floodplains. *Beel*s contribute about 12.3%, and ponds 7.4%. The contribution of riverine habitats is relatively minor. The Kalni-Kushiyara channel yields only 1.5%, other active rivers 1.5%, closed and dead rivers 0.8%, and distributaries only 0.3%. *Duar*s in the mainstream channel contribute about 40% of the total mainstream channel catch. In other rivers, *duars* contribute 9.4% of the catch.

The fish standing crop index (kg/ha/yr) was calculated for the various types of habitat (Tables H.45 to H.47, Figures H.45 to H.47). The richest habitats were *beels* (503.0 kg/ha/yr), followed by mainstream river *duars* (441.9 kg/ha/yr). All other habitats had significantly lower indexes. Floodplain and the Kalni-Kushiyara River (inclusive of *duars*) have comparable figures, 159.7 kg/ha/yr and 192.3 kg/ha/yr respectively. Other open rivers had a mean of 273.1 kg/ha/yr, while

closed rivers had the lowest figure (115.9 kg/ha/yr), an indication of the negative impact of river closures on fish production. Variations in the standing crop within a habitat category was generally moderate, except for *beels* for which the standing crop index ranged from 118.5 to 1,294.3 kg/ha/yr. This may in part be due to the degree of sedimentation of individual *beels*. Caution needs to be exercised in interpretation of the mean standing crop data.

The monthly variation in standing crop index for various habitats is presented in Tables H.48 to H.52 and Figures H.48 and H.49.

Mainstream River Channel
The Kalni-Kushiyara River is a principal migration route for certain high value commercial fish species (major carp, large catfish, *ilish* and *golda chingri*). The biomass peaks during April to May in the Kushiyara River while further downstream in the Kalni, the highest biomass is observed between December and February. One interpretation is that migratory fish may congregate in the lower river section during the dry season, and then swim upstream during the pre-monsoon, probably for spawning. Peak month catches show a high proportion (30% to 88%) of large species (carp, catfish, *ilish*).

Mainstream Duars
The highest biomass was recorded in December and February, suggesting the use of *duars* as overwintering grounds. Peak month catches are heavily dominated by large species (83% to 100%) such as carp and catfish.

Other Rivers
Biomass peaks were very variable in other rivers. This is probably due to the impact of river closures, complex hydrography and variations in the timing of fish movements over a large floodplain. Biomass peaks were recorded in January, June, August and November. Assuming that these rivers act as transit routes, these peaks probably represent migration episodes between spawning, grazing and over wintering grounds. Peak month species composition is dominated by small finfish (58% to 76%). *Golda chingri* can be of some importance as well (5% to 11.2%, when present).

Floodplain
Floodplain production is entirely dependent on in-migration from other aquatic habitats (rivers and their *duars*, *beels*, *khals*) during flood time. This paradox - that the most productive habitat in the project area is not self-sustaining - is a central and critical concept for analyzing and interpreting the potential project impacts on fish production in the project area. The highest biomass was recorded in August and the species composition is usually dominated by small finfish species (in most cases, 60% to 73%). Large catfish are also of some importance (14% to 36%). In one instance *golda chingri* accounted for 52% of the total catch.

Beels
The highest biomass was recorded during the dry season (December to March). Small fish form the largest component (34% to 68%), but carp (14% to 48%), large catfish (up to 18%) and *golda chingri* (up to 10%) are also present in large numbers.

The results of the field survey highlights the importance of the river *duars* and *beels* as critical overwintering habitats for carp and catfish broodstock. Moreover the productivity of the extensive floodplain habitat is entirely dependent on annual restocking from riverine and *beel* habitats.

A comparison has been made between NERP sampling data and DOF nominal statistics. The NERP production estimate for the Kalni River from Markuli to Kalma is 309 tonnes in 1995/96. The nearest available corresponding estimate by the DOF is 3,562 tonnes in 1992/93 for the Upper Meghna River (Comilla, Mymensingh and Sylhet districts). This may indicate a further decline in production during the intervening time period, but the discrepancy may also be due in part to different boundary areas covered and statistical error.

5. PROJECT IMPACTS

5.1 Existing Risks to Fisheries

Fish production in the project area is subject to 5 principal negative risks:

- sedimentation of key habitats (river channels, *duars*, *beels*);
- overfishing with illegal fishing gear;
- poor water quality due to stagnation and contamination;
- fish disease outbreaks, and
- undermining of sound biological management due to revenue collection.

At the same time, increased river discharge due to a long-term trend of increased rainfall in the catchment area is exerting a positive region-wide impact on fish production.

5.1.1 Sedimentation

Field studies have shown that the mainstream river channel, distributaries, *beels*, and *duars* are all undergoing relatively rapid aggradation along the Kalni River downstream of Markuli. Average channel depth along the Kushiyara River between Fenchuganj and Sherpur (8 m) is greater than average channel depth along the Kalni River between Markuli and Katkhal (5 m). Fish standing crop index is also higher along the Kushiyara between Fenchuganj and Sherpur (263 kg/ha/yr) than in the Kalni River (mean of 169 kg/ha/yr). It is reasonable to assume that this difference is controlled by channel depth.

High velocity over bank spill during the pre-monsoon season is causing a rapid in-filling of *beels* in the project area. NERP case studies at 8 locations indicate that *beel* area has declined on average by 28% during the last 15-20 years. However, *beel* depth has declined even more - by 44%. Due to this ongoing process of sedimentation, the *beel* becomes shallower at a faster rate than it loses surface area. Maximum *beel* depth is correlated with standing crop index. This suggests that actual loss of fish abundance from *beels* will be 1.6 times greater than indicated by the rate of loss of *beel* surface area.

5.1.2 Water Quality and Agrochemicals

Population increase is leading to an increase in the production of domestic sewage. Almost all of the sewage enters the aquatic environment. This nutrient loading likely results in a general increase in primary and secondary production and in turn fish production. This should generate a continuous increase in fish production, paralleling human population growth (1.8% per year over the last 10 years).

Intensification of agricultural practice is leading to increasing application of fertilizer in the region. A portion of this fertilizer enters the aquatic environment, either directly or as nutrients from decomposing or otherwise transformed crop waste (more precisely, that portion of waste representing the marginal increase in crop production due to the application of fertilizers). The increase in nutrients from fertilizers can be expected to result in increases in fish production. High rates of application of nitrogen fertilizers might, however, over-eutrophicate the aquatic environment. This could depress fish production.

Agricultural intensification invariably leads to increasing use of pesticides and more residues in the environment. Lethal and sub-lethal toxicity will reduce fish production. 5.1.6

Inadequately treated effluent discharges from the Fenchuganj fertilizer plant are lethal or sub-lethal to fish in the Kushiyara River. Losses in fish production began abruptly with the start-up of the plant, and will continue until there is an improvement in effluent treatment or the plant closes.

5.1.3 Fish Disease

Severe outbreaks of epizootic ulcerative disease and massive fish mortality appear to be induced by deteriorating water quality. Water is stagnant in some *beels*, *khal*s and borrow pits during the late monsoon season due to the siltation of outlet channels. This results in a loss of fish production. Stagnant water conditions, coupled with increased fertilizer application, leads to massive proliferation of aquatic macrophytes. The subsequent death and decomposition of this heavy load of organic plant material leads to severe changes in water chemistry (acidification, oxygen depletion, heavy metals release from sediments). This weakens fish and reduces their ability to resist infection. 5.2 5.2.1

5.1.4 Fisheries Management and Revenue Collection

The use of small-mesh monofilament nets (*current jal*) is a continuing problem in the area. Although this gear is highly efficient, it cannot distinguish between adults of small species (which would be an acceptable target) and juveniles of large species (especially *ilish* and carp). Over harvesting of juveniles depresses stock abundance. Efforts to control the use of this type of net have not been especially successful.

In 1996, river fisheries were declared open access fisheries by the GOB. This has resulted in a large increase in the number of fishers. Both legal and illegal fishing gear now contributes to overfishing of stocks.

5.1.5 Increasing Discharge

River discharge (consequently, flood intensity) is known to be a direct determinant of fish production on floodplain. The general trend of increasing discharge in the region should increase fish production. Catch statistics from DOF and Ajmiriganj Fish Industries Ltd., however, show a declining trend.

One possible explanation is that only very strong flood years are important for increasing fish production. Medium and low intensity flood years generally result in progressive fishing out of broodstock from the critical *beel* and *duar* habitats. Extreme flooding, such as in 1988, could result in strong recovery of major carp and large catfish, and large quantities of hatchlings. Broodstock could appear in catches two to three years later. The relationship between flood intensity and fish catch may be curvilinear rather than linear. In such a model, floodplain fish stocks are replenished during periodic strong flood years. They are generally fished out during intervening medium and low flood intensity years.

5.1.6 Closed Water Fisheries

The fish culture practices in the project area are traditional in nature. In most cases both stocks and harvests of fingerlings are irregular and do not follow any prescribed rule. Feeding and fertilization in the currently cultured ponds is either completely absent or it occurs irregularly. The pond owners usually release an uncounted stock of fingerlings during July and August and harvest them during March and April in the following year from flood free ponds, and sometimes in the same year from those ponds which are susceptible to inundation by the flood. They collect fingerlings mainly from natural sources or from private nurseries as there is no government fish seed farm in the project area. Many ponds are inundated by floods in some years and this threat of flooding often discourages pond owners from investing in fish culture.

5.2 Expected Future Trends Without Project

5.2.1 Some Fisheries-Hydrology Interactions

In order to develop appropriate forecasting capability for project impact, the empirical relationships between fish abundance/productivity and several relevant physical environmental parameters were investigated.

Flood Intensity and Fish Production

Significant year to year variation in catch is a normal feature of floodplain fisheries. Studies on tropical floodplain fish production dynamics in various parts of the world have shown that a major part of this variation can be attributed to annual variation in flood intensity. In the Northeast region, lack of sufficient water on the floodplain during the 1992 monsoon resulted in a shorter grazing period and facilitated overfishing. Overall fish production in the Chamraghat area, for example, was at least 30-35% lower than the previous year. Most of the retailers in the *ghat* stated that fish were on average 30-40% smaller compared to the same time (September) in 1991. Similar slow growth was observed in Shanir Haor in 1992. Low water levels and reduced fish production were reported in 1992 for the Khaliajuri and Ajmiriganj areas. Further evidence of a causal relationship between flood intensity and fish production is the region-wide recovery of carp catches in 1988/89, which was probably due to heavy flooding in 1987 and 1988. This implies that even if carp stocks and other fish stocks are over-harvested, they have a capacity to recover during periodic heavy flood years.

The most general index of flood intensity in the region is the discharge of the Upper Meghna at Bhairab Bazar (Tables H.53 and H.54, Figures H.50 and H.51). Regression analysis was performed using DOF/BFRSS capture fisheries production data for the region and Ajmiriganj Fish Industries Ltd. (AFI) fish purchase and export data. Various combination give different relationships (for example Table H.55 and Figure H.52, for total fish purchase of Ajmiriganj Fish Industries Ltd.). The best correlation of mean discharge from June to October was with AFI finfish exports of the same year plus the following year ($0.02 > P > 0.01$) (Table H.56), highlighting the importance of both the rapid turnover of smaller species production and the one or more year lag effect of slower growing larger species.

The analysis suggests that AFI data is of relatively higher quality compared to DOF/BFRSS data. The poor correlations with AFI finfish purchases and prawn exports may be due to market effects, rather than biological effects.

River Channel Depth and Fish Standing Crop
Although the empirical data set is limited (Table H.57), there is good reason to believe a general relationship exists between river channel depth and fish standing crop (Figure H.53). The equation can be used to predict possible changes to fish standing crop resulting from increases in river channel depth (due to dredging) or from decreases in river channel depth (due to siltation).

Beel Depth and Fish Standing Crop 5.2
Both empirical data and conventional wisdom suggest a positive relationship exists between *beel* depth and fish standing crop (Table H.58 and Figure H.54). Caution should be used in applying the indicated equation for forecasting, as fish biomass in *beels* can be heavily influenced by harvesting practices (such as dewatering) or mass mortality due to disease, and therefore the current data set generated by NERP may be of limited reliability.

5.2.2 Open Water Fisheries

Without project interventions, the structural quality of fish producing habitats, especially critical *beel* and *duar* habitats, is likely to continue declining.

Sedimentation of the Kalni-Kushiyara channel will continue. This will result in decreasing channel depth, loss of *duars*, greater channel instability, more frequent avulsion events, and disruption of migration routes. Distributaries are also likely to aggrade. This will decrease catches of riverine species. Shallow habitats during the dry season will accelerate fishing out of broodstock. The magnitudes of these impacts were analyzed on the basis of NERP fisheries studies and they are described below.

5.3

Kalni River Channel
Due to the ongoing process of siltation water surface area will be reduced by about 375 ha during the dry season. This will decrease fish production by about 76 tonnes from its present level based on current standing crop index. There are 6 *duars* in the Katkhal area between Shantipur and Kadamchal. Siltation of these *duars* will reduce fish production by about 15 tonnes on an area basis from its present level. The overall decrease is 91 tonnes. 5.3

Other Rivers
Observation of past fish production and field investigation suggest an annual decline of about 3% due to channel bed siltation. This declination corresponds to a reduction of about 19 tonnes from its present production level.

Floodplains
Compared to riverine habitats, a substantially greater loss in fish production is expected from the floodplain habitats. Floodplain inundation will be increased partially during the pre-monsoon season due to frequent over bank spill and breaches in the river banks. It will increase fish catch in the floodplain during the pre-monsoon season. This is likely to be accompanied by a shift to more sedentary floodplain species. *Ilish*, *pangash*, and some major carp species will possibly become extinct in the region (a trend which is already underway). However, the overall fish production in the floodplain will be decreased by about 2% due to the decrease in overwintering ground (mainstream channel and *beels*) and broodstock. This corresponds to a reduction of 831 tonnes from its present level.

Beels/Haors

The *beel* habitat will suffer the greatest loss of all habitat types. The rate of *beel* siltation will be increased due to frequent high velocity over bank spill and breaches in the river banks (Table H.59). Estimated *beel* area loss over the next 30 years is approximately 1,095 ha (21.2%) (Table H.60 and Figure H.55). This is equivalent to 642 tonnes of fish production on an area basis, and over 1,027 tonnes if adjusted for the likely loss in maximum *beel* depth.

5.2.3 Closed Water Fisheries (Ponds)

The production rate from cultured ponds in the project area is low at about 1,635 kg/ha/year. For culturable ponds in the area, the production rate is lower still. Lack of knowledge of culture techniques and non-availability of fry and fingerlings is reported to be the main reason for poor adoption of fish culture in the area. Under FWO conditions, the future evolution of the River (spills and breaches) will result in siltation of cultured ponds. The overall expected decrease in fish production from this pond siltation is 202 tonnes. Fish culture extension program is a part of the activities of the DOF. The Thana Fisheries Officer (TFO) is the designated person to undertake fisheries extension programme. During the survey it was found that there are at present few farmers who are in contact with the local TFO and are thus culturing fish by using improved techniques. Manpower and transport constraints inhibit the local DOF offices to undertake any meaningful extension activities.

In summary, open water fish production will be reduced by 2,170 tonnes under the FWO conditions.

5.3 Expected Impacts of Project

5.3.1 Open Water Fisheries

All aquatic habitats within the larger impact area and the direct intervention area are important for fish production. They are interconnected physiographically, hydrologically and biologically, and constitute the functional components of the overall floodplain ecosystem. This inter-connectivity implies that the loss of a particular water body (i.e. loss of a *beel* due to sedimentation, loss of a *duar* due to a loop cut) will result in a net loss in floodplain fish productivity which is greater than the nominal individual production level of that water body. Production accounting in floodplain fisheries, therefore, cannot be carried out by using simple arithmetic (as might be the case in the agriculture sector) because the second order impacts on production in remote but interconnected habitats must also be included in the balance sheet. The methodology for estimation of these second order impacts is not precise enough to allow for reliable valuation in cost-benefit analysis. As a general operational guideline however, it may inferred that loss of *duar* or *beel* area will have a relatively large second order loss effect, while loss of river or floodplain habitat will have a smaller second order effect.

Impacts on open water fisheries production were analyzed on the basis of catch assessment survey, fisheries effort survey and market survey.

The project is expected to have the following positive impacts on fisheries:

- The improvement in channel depth from dredging, and alleviation of channel siltation due to self scouring, will increase fish production in the river channel. The impact of increased depth and wetted surface area will be especially favourable during the dry season. Species which normally require greater depth (ie *pangash*) could possibly re-establish themselves in the project area, resulting in an increase in biodiversity. A new artificial *duar* will be created by the Katkhal loop cut at Kaisar.

- The proposed installation of a fishpass at Koyer Dhala will allow fish to cross the existing *khal* closure. The impact will be greatest during the pre-monsoon floods period, when both adult broodstock searching for spawning grounds and hatchlings and fingerlings requiring nursery grounds will be able to access the Kodalia fishery grounds.

The expected negative impacts of the project are as follows:

- The proposed loop cuts will affect 6 river *duars*, thus resulting in a some direct loss of fish production from *duar* harvesting and an indirect loss of fish production from the neighbouring floodplain and riverine habitats which are dependent on the *duar* for restocking. These *duars* are currently subject to siltation in conformity with general siltation of the river channel. The proposed channel dredging would serve to alleviate general *duar* siltation.

- The inundated area of the floodplain will remain constant during the main monsoon flood period, but the duration and depth of flooding will be reduced due to flood protection during the pre-monsoon flood period and late monsoon drainage period. This will result in reduced pre-monsoon access to the floodplain and more crowding of fish and reduced growth during the late monsoon, both of which will lower fish production.

As noted above, quantitative analysis of impact is problematic. The description of expected impacts, presented below and in Table H.61, should be considered provisional and indicative only.

Kalni River Channel

Dredging will deepen the channel and consequently increase the water surface area during the dry season by about 650 ha (Figure H.56). The surface area increase alone should result in a nominal increase in fish production of about 131 tonnes. However the increased surface area will overlie a quality improved, deeper river channel, which can be expected to support higher fish biodiversity and production (measurable either as biomass per unit water surface area or unit water volume). Channel deepening can therefore expect to increase fish yields to a greater extent than predictable by marginal surface area increase, perhaps by 200-300 tonnes.

Fish production in *duars* will be affected by loop cutting (Figure H.57). At the Katkhal loop cut, all six *duars* will suffer decreases in maximum dry season depth (average of 27.2%), and three of them (Mahtabpur, Cherapur, Kanchanpur) will become detached from the mainstream channel and semi-isolated in the loops (Table H.62 and Figure H.58). The new mainstream channel alignment created by the loop cut will create a new *duar* at Kaisar. This mitigation is expected to dampen the net loss in direct production from *duars* to about 10% (3 t). The impact of *duar* modification extends to adjacent floodplain habitat, as the *duars* provide 'seed' to an area of

approximately 1,300 ha. The expected loss in adjacent floodplain fish production is about 24 tonnes.

Loop cut impacts on fish production at the Issapur loop cut will be minimal (Figures H.59 and H.60). The *duar* at Issapur is likely to remain stable (or possible scour deeper), while the small shallow *duar* at Bangalpara (a recent unstable formation) will become detached from the mainstream channel and likely fill in again. No net change in fish production is expected.

The increase in fish production due to channel deepening will exceed the decrease due to *duar* modification and loss, resulting in a net gain in fish production from the mainstream river channel. A general improvement in self-scouring of the river channel which could possibly lead to more scouring of the mainstream *duars*, thus increasing their capacity to harbour broodstock during the dry season and further enhance production.

Other Rivers

The rate of channel bed siltation will be reduced from its present level, suggesting fish production will not be negatively affected. As there exists considerable fish traffic between the Kalni mainstream channel and smaller tributary rivers, any increase in Kalni River fish stocks should also result in an increase of fish stocks in other rivers.

Floodplain

Flooded area during the pre-monsoon will be reduced, and this will negatively affect fish production. The loss of pre-monsoon flooded hectares depends on the flood return period. For a 1:2 year flood, flooding will be reduced by 84.2% (63,939 ha). Floods of longer return periods will have lesser but still significant impacts. A 1:5 year flood will reduce pre-monsoon inundation by 25.5% (55,047 ha), while a 1:10 year flood will reduce it by 16.3% (44,281 ha). Studies have shown that pre-monsoon flooding is extremely important for breeding migrations and annual restocking of floodplain nursery and grazing habitats. Interference with pre-monsoon flooding can therefore have a major impact on the subsequent monsoon flood grow-out period, even if the monsoon flood intensity is adequate.

The proposed fishpass at Koyer Dhala would act to mitigate the negative effect of pre-monsoon flood constriction on fish production on the left bank floodplain around Ajmiriganj by allowing *boal*, *kalibaush*, *gonia* and other important migratory species to enter the tributary system to spawn on the floodplain in greater numbers during the pre-monsoon. Passive drift of hatchlings and fingerlings through the fishpass from upstream areas would further enhance floodplain fish production. The degree to which this will compensate for the loss in pre-monsoon flooding during the average flood return period on both river bank floodplains is however unclear. It would be economical to assume that the net benefit recovered might be in the order of 10 to 20%. Nonetheless, the marginal economic benefit is likely to exceed the cost of construction and operation of the fishpass structure and generate a robust internal rate of return.

More rapid drainage during the late monsoon will decrease flood intensity by reducing inundation duration and depth. The result would be reduced fish production due to a marginally shorter growing period and possibly more crowding. Because the open floodplain is the most productive environment for fisheries, even small reductions in fish growth increments (i.e. 1% or 2%) can lower overall fish production significantly. The proposed project intervention will reduce flooded area progressively during November (33,756 ha), December (14,104 ha), January (2,883 ha) and February (765 ha), for a total loss of 51,508 ha-months of inundation. Normal pre-project

inundation is 156,297 ha-months, indicating a 67% decrease in late monsoon flood intensity. Monsoon flooding from June to October covers some 260,200 ha of floodplain, and represents 1,301,000 ha-months of flood intensity. The overall loss in monsoon flood intensity due to accelerated late monsoon drainage is thus 4%. Faster drainage would force a marginal fraction of fish off the floodplain and into overwintering refuge habitats where their growth rate is expected to decrease, resulting in some loss of fish production.

The net impact of the project on floodplain fish production is expected to be an approximate loss of 5%, or 2,078 tonnes.

Beels/Haors

The rate of bank overflow and breaches of the river banks during the pre-monsoon season will be reduced and consequently *beel/haor* siltation will also be reduced. *Beel* fish production will accordingly stop being negatively impacted by siltation, and would stabilize at present levels. Some of the increased fish biomass expected in the mainstream river channel would spill over into *beel* standing crop, as *beels* are suitable overwintering grounds for juveniles of some species.

Stabilization of *beel* habitats will also have a positive benefit for floodplain production as overwintering *beel* fish stocks also provide 'seed' for annual restocking of the floodplain environment during the monsoon flood period (in a manner similar to river *duars*).

These enhancing measures are expected to increase *beel* production by 5%, or 1,363 tonnes.

5.3.2 Closed Water Fisheries

The project is expected to have a small positive impact on pond fisheries in so far as flood duration is expected to decrease, thus resulting in a longer growing period for pond fish and reduced risk of pond flooding.

The 2 proposed loop cuts will create 6 isolated river loops. These river loops will retain hydrological links to the Kalni River mainstream channel and will thus continue to be fish producing habitats, albeit greatly modified from their original qualities.

6. MITIGATION AND ENHANCEMENT MEASURES

6.1 Proposed Fishpass at Koyer Dhala Closure

Project Rational: An earthen *bundh* closure across the Old Kushiyara River at Noagar village near its junction with the Kalni River prevents the migration of fish stocks between the two channels. This has caused a negative impact on fish stocks in the Kodalia Fishery (Figure H.61). It is proposed that the migration route be opened by the construction of a fishpass, with a water regulator and navigation pass, across the *bundh*.

Location and General Data:
District: Habiganj.
Thana: Ajmiriganj & Baniachang.
Type: Flood control *bundh*.
Status: Embankment/*bundh*.
Total area: 5000 hectare (wetland inside *bundh*)
Surrounding Villages & Wetlands: Southern side: Birat, Nagor; Northern side: Hilalpur, Naogao, Pirispur, Badalpur, Eastside Jolshuka, Westside Ajmiriganj.

Hydrology: The Jhingri River flows to the southeast of the Kodalia River whilst the Kushiyara River flows past on the western side. The total area was about 400 hectare and average depth ranged from 2.5-3.5 m. with a highest depth of 4.0 m.

History: A strong earthquake in the Ajmiriganj area, in 1904, caused the course of the Kushiyara River to change originating in the Kodalia River. From Ajmiriganj to Jolshuka the river is known as the Old Kushiyara River whilst from Jolshuka to Noagar village it is known as the Kodalia River. The latter is also more commonly know as the Kodalia Fisheries. Koya Beel located on the bank of the Kushiyara was connected through a *khal*, the Koyer Dhala, with the Kodalia River. Every year monsoon floods entering the *khal* caused immense damage to crops. To prevent this damage reoccurring the community of Ajmiriganj, Jolshuka, Badalpur, Baniachang unions closed the *khal*. This was achieved through the Food for Works Programme. Finally, in 1991 the construction of an earthen closure at Noagar village resulted in completely blocking the migratory route.

Fisheries Resources: The Kodalia River is the important fishery shelter of Ajmiriganj and Baniachang areas. The following species of fish can be found in the water body:

Major carp: *rui, kalibaush*
Introduced carp: Common carp
Large catfish, knifefish and others: *air, boal, lachu, ilish, rita*
Small catfish: *garua, gulsha, bacha, pabda, tengra, batasi*
Other small species: *icha, baim, chapila, bailla, mola, kaikka, rani, foli, gutum, puti, chela, dhela, bata, koi, chanda, taki, mola, kholisha.*

Migration: When the Kushiyara River connected with the Kodalia River then species such as *rui, catla, kalibaush, rita* migrated from the Kodalia to the Kushiyara whilst smaller species migrated the other way for breeding. Eggs and hatchling also entered the Kodalia and adjacent *haors* and ditches. It was also not uncommon to find fish migrating from the Kodalia to the Old Kushiyara near Ajmiriganj Bazar. In 1991 the closure of the Koyer Dhala destroyed this migration route.

Fishing Practices: Kodalia River, or Kodalia Fisheries, is one of the most important sources of fish in this area. It was leased out through the Habiganj Revenue Department over 3 years. The total area was 129 ha with fishing activity occurs mainly from February to March however subsistence fishing is conducted throughout the year. Last year the Kodalia Fisheries generated an income of Tk 900,000. Main gears used in this area are *current, vata, thella, jhaki, ber.*

Fish Production in 1995/1996 was as follows:

Month	Production (kg)		Species
	1995	1996	
August	2366.40	970.84	*boal, air, lachu, gulsha, pabda, bacha, garua, icha, baim, kalibaush, veda, carpio, rita, foli, chitol, tengra bele, chapila, gutum, taki, mola.*
September	949.50	767.16	
October	717.53	1,457.13	
November	176.29	857.27	
December	981.46	-	
January		1,205.90	
February		998.47	
March		317.55	
April		617.00	
May		532.93	
June		-	
July		572.40	

6.2

6.2.1

Production Trends and Impact on Fisheries: Fish production was high in comparison to present time. Amongst the numerous reasons for this reduction is the closure of the migratory route. The closure has prevented eggs and fingerlings migrating from the Kodalia to the Kushiyara resulting in declining yields.

Fishpass Design: To eliminate the negative impact caused by the closure, a vertical slot fishpass needs to be constructed on the Koyer Dhala closure.

Presented below are suggested parameters of the construction with conceptual drawing in Figure H.62:

Type:	Single-jet vertical-slot
Length:	120 m (concrete section)
	144 m (including protective works)
Maximum Height:	8.00 m
Maximum Width:	6.00 m
Invert Elevation:	0.00 m PWD at C/S
	2.00 m PWD at R/S
Deck Elevation:	7.00 m PWD at C/S
	7.00 m PWD at R/S
No. of Pools:	18 + 2 observation chambers
Pool Length:	4.00 m
Pool Width:	3.20 m
No. of Baffles:	17
Baffle Height:	4.50 m
Slot Width:	400 mm
Maximum Total Head (R/S wl - C/S wl):	3.50 m
Maximum Head per Baffle:	0.20 m

Predicted Impact of Noagar Fishpass:

Total area of Old Kushiyara River and Kodalia Fisheries	334 ha
Present fish yield	157.1 kg/ha/yr
Annual production	52.47 t
Predicted yield (future with project)	273 kg/ha/yr
Predicted annual production (future with project)	91.19 t
Incremental annual production due to project	38.72 t

6.2 Proposed Dolphin Sanctuaries in Lower Kalni River

6.2.1 General Information on Freshwater Dolphin in the Northeast Region

The Gangetic dolphin, *sisu* (Platanista gangetica) shares commonality in distribution and habitat with the larger fish species. *Sisu* are especially abundant in the rivers during the rainy season and may also move on to floodplains. During the dry season they stay in deep *duars* in the larger rivers. Their food consists of most varieties of fish species. A high abundance of fresh water dolphins is an indicator of increased water depth, greater number of larger fish and the existence of fish migratory routes within the river channel.

Sisu is common in the Surma and Kushiyara Rivers (Table H.63 and Figure H.63), as far upstream as when Barak River forks at the Indian border at Amalshid. Dolphins are also seen in the Babur Duar near Sheola Ghat of the Kushiyara River. Further downstream, dolphins occur at the junction of the Pumphouse Khal of the Manu River Irrigation Project with the Kushiyara, and also at the confluence of the Manu and Kushiyara. Dolphins are especially abundant in the Ajmiriganj area, with a large presence near Sullah Bazar. This is a shallowly inundated area with numerous fish. Bordair Duar is located at the confluence of the Bheramohona River and the

Bordair Khal. The *duar* is renowned for larger sized catfish (particularly *Air*), *Chitol* and *Guzi* as well as the presence of dolphins. Dolphins also occur in the Surma River at Sunamganj and near Jamalganj. Fresh water dolphins are most common in the Chamraghat area, particularly at the confluence of the Narasunda and the Dhanu River (near Noagaon village) where they occur in large numbers.

There is no targeted fishery for dolphin in the project area. Some are occasionally caught by accident in fishermen's nets. Their oil is extracted and thought to be beneficial to pregnant women.

6.2.2 Proposed Dolphin Sanctuaries

The freshwater dolphin is a valuable natural resource asset of the Northeast region. It is proposed that one or more permanent dolphin dry season refuge be created in the project area. The new *duar* at Kaisar, created by the Katkhal loop cut, is probably the most suitable location for the refuge. It is thought that the *duar* will be particularly stable and lends possibility for engineering methods to enable it to be larger and deeper.

Whether or not dolphins choose to inhabit the new *duar* in substantial numbers can only be ascertained once the project becomes operational and the *duar* is formed. Should the dolphins reject the site, other suitable locations for long term dolphin sanctuaries should be assessed in the project area.

A research and management program should be initiated in the sanctuary *duars*, including distribution and biological studies. Opportunities should also be explored for dolphin watching in ecotourism development programs for the area.

6.3 Fisheries Management Measures

It is proposed that necessary measures be taken to establish fisheries associations composed of genuine fishers and women fish processors. This includes having fishing rights transferred from leaseholders to the associations. At the very least this could take the form of NFMP *nitimala* arrangement. However a more promising system that should be examined is one where the association's fishing rights include full titled and monopoly ownership of the water body. This should insure long term continuity of tenure and curtailment of competition between harvesters specific to that water body/association. Assistance could be given by the project to train the association members in biological fisheries management practices and to develop fisheries harvesting and conservation plans.

6.4 Fish Sanctuaries

Fishery associations will be assisted to create and maintain fish sanctuaries in critical habitats, especially overwintering habitats for broodstock (*duars*, *beels*) and fishpass access lanes. The use of *katha* as a sanctuary device will be tested.

6.5 Floating Cage Culture

This will be introduced in association with pond culture as a preventative measure against losses resulting from monsoon flooding and for increasing grow-out periods. It will also be used as a fattening operation for both wild and cultured fish. The advantage of floating cages in areas prone to intensive monsoon flooding over other types of aquaculture practices will need to be tested through a pilot study before scaling up.

6.6 Rare Species Re-introduction Program

Deepening of the Kalni-Kushiyara channel through dredging will create important opportunities to increase fish biodiversity in the region. The isolated river loops created by the loop cuts will retain regulated hydrological connections with the mainstream river channel. This will enable long term usage of the water bodies for enhancing fisheries and preventing further loss for agricultural practice. Some of the river loops will be used as partial grow out facilities for fish species which are near to extinction in the region. The intention will also attempt to reintroduce regionally extinct species into the Northeast Region.

An on-site induced breeding hatchery will be constructed where broodstock of fish species such as *nandina, angrot, sarputi, pangash* and *mohasol* will be kept. Fry from induced breeding will be raised in floating cages in the river loops and then liberated as juveniles (15-30 cm size class) into the mainstream river channel during the pre-monsoon and monsoon flood periods.

TABLES

Table H.1 NERP Fish Production Sampling Sites

Habitat Category	Site no.	Habitat Site	Reach Length (km)	Site Area (ha)
Riverine: mainstream river channel	107	Kushiyara River (Kashimpur to Sherpur reach)	7	140
	100	Kalni River (Markuli to Saudersiri reach)	4	80
	101	Kalni River * (Badalpur to Ajmiriganj reach)	9	180
	104	Kalni River * (Ajmiriganj to Katkhal reach)	11	220
Riverine: *duar* (in Kalni River mainstream channel)	121	Gudimukh Duar * (Badalpur to Ajmirigan reach)	-	9
	122	Mahtabpur Duar * (Ajmiriganj to Katkhal reach)	-	10
	123	Shahebnagar Duar (Katkhal to Mdan reach)	-	14
Riverine: open distributary	105	Kalni River (Derai to Dalbazar reach)	4	60
	106	Sinai River (Islampur to Kadamchal reach)	3	18
Riverine: closed distributary	130	Kalni River (Dalbazar to Kalni closure)	4	60
	131	Old Kushiyara River (Koyer Dhala to Jalshuka reach)	4	60
Floodplain: floodplain	114	Kumarpara floodplain	-	20.23
	PU1	Gazaria	-	6
	PU2	Shahnagar	-	6
	PU4	Kakailseo	-	3.32
	PU5	Katkhal	-	5
Floodplain: *beel*	132	Bheramohona Beel	-	50
	113	Biddyakhola Beel	-	12.14
	112	Dhuiya Beel	-	29.14
	111	Barogop Beel	-	40
Total	**20**		**109**	**795.69**

Note: Fish production data given for these two river stretches includes production for the two respective duars.

H2

Table H.2: Areas of Habitat Types in Project Area

Habitat Group	Habitat Type	Number	Length (km)	Area (ha)	Area (%)	% Total Aquatic Habitat
Riverine	Kalni-Kushiyara River channel		172	3,955	1.4	
	Other flowing rivers			3,104	1.1	
	Closed & dead rivers			3,721	1.3	
	Distributaries			1,250	0.4	
	Sub-total			**12,030**		**4.2**
Floodplain	Floodplain (net of other habitats)			260,200	90.3	
	Beels			13,340	4.6	
	Ponds			2,466	0.9	
	Sub-total			**276,006**		**95.8**
All aquatic habitats	**Total**			**288,036**	**100**	**100**
Non-aquatic Habitats	Urban areas, infrastructure			47,564		
Gross Project Area	**Grand total**			**335,600**		
	Beels in 3 km intervention zones	159		5,172	38.8[1]	
	Duars in Kalni-Kushiyara River channel	72		720	18.2[2]	
	Duars in Old Surma River & Baulai Rivers	18		180	5.8[3]	

Note 1: (as % of total *beels*)

2: (as % of Kalni-Kushiyara channel)

3: (as % of other flowing rivers)

Table H.3 List of River *Duars* in Project Area

Name of *Duar*	Adjacent Village	Depth (m)
KUSHIYARA RIVER (Kaktai to Markuli)		
Rokonpurar Duar	Pump house	10-11
Dekapurar Duar	Dekapur	10-11
Sonapurar Duar	Sonapur	13-14
Sadapurar Duar	Sadapur	10-11
Azampurar Duar	Azampur	10-11
Sheikpurar Duar	Sheikpur	10-11
Islampurar Duar	Islampur	11-12
Berkurir Duar**	Berkuri	19
Shapurar Duar**	Shapur	15
Korchar Duar**	Korchabaid	17
Chorkir Duar**	Abdullapur	21
Jalalpuar Duar**	Jalalpur	18
Jamirkonar Duar**	Jamirkona	17
Poradair**	Islampur	12
Poradair**	Poilanpur	17
Manumuk**	Manumuk	14
Bahadurpur**	Bahadurpur	11
Brahmangaon**	Brahmangaon	23
Perkular Duar**	Perkul	16
Kamarkheda**	Kamarkheda	15
Hossainpur**	Hossainpur	15
Mirkhalir Duar**	Ahmadpur	17
Digholbagh**,*	Digholbagh	14
Digholbagh**,*	"	16
Digholbagh**,*	"	18
Digholbagh**,*	"	32
Atghor**	Atghor	19
Bara Pechi*	Pechirbazar	16
Jalalpurar Duar*	Jalalpur	14
Kaittar Duar*	Kaitta	14
Bagakhalir Duar*	Banglabazar	25
Alokdir Duar*	Alokdi	19
Pilegaor Duar*	Pilegaon	18
Ranigangar Duar**,*	Raniganj	22
Alampurar Duar**	Alampur	18
Balichata**	Balichata	17
Bagmaynar Duar**	Bagmayna	19
Roailar Duar**,*	Roail	31
Mohiskonar Duar	Mohiskona	15-16
Baushir Duar	Baushi	15-16
Galishalar Duar	Galishal	12-13

Notes: * Duars suitable for fish sanctuaries

** Echo sounding data (all other depths are recorded from interviews with fishermen)

Table H.3 List of River *Duars* in Project Area (Cont'd)

Name of *Duar*	Adjacent Village	Depth (m)
KALNI RIVER (Markuli to Kalma)		
Markuli Duar (= Tuchandppur Duar)	Markuli	12-13
Hilalnagar Duar		
Fayzulkpur Duar		
Saudersiri Duar		
Korcha Duar		
Pratappurar Duar (= Pahanpur Duar)		
Bherar Duar (= Verardor Duar)	Pratappur	11-12
MatiDuara (= Lalthakun Duar)		
Katakhali Duar	Bherardohor	12-13
Badalpurar Duar	MatoDuara	11-12
Kaiadhala Duar		
Putiarkanda Duar	Badalpur	11-12
Pirispurar Duar		
Bheramona Duar		
Gudimukh Duar	Pirispur	11-13
Nawanagar Duar	Ajmiriganj	7-8
Bardair Duar		
Chondir Duar		
Santipur Duar	Ajmiriganj	6-7
Matabpur Duar	Ajmiriganj	7-8
Shahebnagar Duar		
Srigangmukh Duar		
Kanchganpurar Duar		
Kaoni Duar		
Kalimpurar Duar	Kanchanpur	10-11
Ichapurar Duar		
Adampurar Duar	Kalimpur	9-10
Echordir Duar**	Ichapur	10-11
Bagailar Duar**	Adampur	10-11
Chatalparar Duar**	Astagram	28
Ainargoop**	Bagail	15
	Chatalpar	24
	Ainargoop	21
OLD SURMA (Derai to Dhanpur)		
Jaykalasar Duar	Jaykalas	10-11
Ghazinagar	Ghazinagar	10-11
Thakurbogar Duar	Thakurbogar	10-11
Sujanagarar Duar	Sujanagar	10-11
Chandpurar Duar	Chandpur	10-11
Chandpurar Duar	Chandpur	10-11
Narsinghpurar Duar 2	Narsinghpur	9-10
Kartikpurar Duar	Kartikpur	9-10
Katorar Duar	Kator	8-9
Guchir Duar	Kator	7-8
BAULAI RIVER (Dhanpur to Goradigha)		
Puran Duar	Dhanpur	12
Batagar Duar	Bataga	10-11
Itnar Duar 3	Itna	11-12
Kulirbidar Duar	Kulirbida	10-11
Elongjurir Duar 2	Elongjuri	10-11
Bagadiar Duar	Bagadia	10-11
Mitamainar Duar 2	Mitamain	10-11

Table H.4: List of *Beels* in Project area

Sl. No.	Name of *Beel*	Area (ha)
Ajmiriganj		
01.	Shingara	36.50
02.	Phome	35.77
03.	Naluaganj	35.63
04.	Haitula	16.33
05.	Gordair	72.87
06.	Biddakhola	8.23
Baniachang		
01.	Phiri	27.93
02.	Dairganj	32.30
03.	Mohish chatol	15.41
04.	Barash khowa	20.19
05.	Chandora	47.46
06.	Beri	38.08
07.	Teri	31.53
08.	Chhep	41.66
09.	Rakua	18.66
10.	Puran	21.73
11.	Kharenga	21.78
12.	Shonadoba	16.05
13.	Kampripuk	34.87
14.	Shapna	19.25
15.	Dhanna	24.35
16.	Naykunda	23.46
17.	Balkar	13.45
18.	Nawabad	45.29
19.	Chitalia	17.35
20.	Bauraganda	15.47
21.	Bangni	17.35

Table H.4: List of *Beels* in Project area (Cont'd)

Sl. No.	Name of *Beel*	Area (ha)
22.	Kata	12.69
23.	Bhanga	18.76
24.	Shankordanga	68.67
25.	Banra	27.81
26.	Gobindapur	14.93
27.	Kandaia	11.82
28.	Chatal	5.19
29.	Borang	21.86
30.	Doba	44.98
31.	Balian	19.33
Nabiganj		
01.	Baradullah	14.54
02.	Beri	37.07
03.	Amritkundu	34.36
04.	Ber	11.23
05.	Tanla	6.40
06.	Kharia	49.41
07.	Gangjua	31.27
Derai		
01.	Handua	26.72
02.	Sandua	40.42
03.	Haria	50.14
04.	Tatus	38.08
05.	Kanchu	82.30
06.	Punia	15.71
07.	Kakhara	29.05
08.	Shosha	70.36
09.	Haralirgop	79.09
10.	Bhuya	95.68

Table H.4: List of *Beels* in Project area (Cont'd)

Sl. No.	Name of *Beel*	Area (ha)
Fenchuganj		
01.	Aya	27.45
02.	Barwa	18.34
03.	Chura	10.02
04.	Karia	16.62
05.	Kharua	76.32
06.	Kariya	57.23
Golabganj		
01.	Bansea	11.49
02.	Phatamedi	28.23
03.	Billimai	38.42
04.	Dambhadigha	23.69
05.	Bansa	11.27
06.	Paraya	58.10
07.	Gola	14.38
Astagram		
01.	Chordoa	10.63
02.	Boraduar	17.89
03.	Ruder	34.80
04.	Beri	46.92
05.	Juaria	24.98
06.	Ghoradigha	30.70
07.	Gordair	33.13
08.	Bandra	119.96
09.	Chamail	18.98
10.	Channa	60.54
11.	Dhopa	35.55
12.	Matikata	11.95
13.	Bahuduni	40.19

Table H.4: List of *Beels* in Project area (Cont'd)

Sl. No.	Name of *Beel*	Area (ha)
14.	Haor chapra	40.58
15.	Mogunal	24.13
Mitamain		
01.	Borogop	513.73
02.	Dhuiya	18.12
03.	Changa	59.12
04.	Laokura	27.33
05.	Atrai	99.08
06.	Khunkhuni	24.49
07.	Deodhari	18.77
Itna		
01.	Chalna	125.33
02.	Gayber	86.92
03.	Bhurunnail	47.19
04.	Kaittakanda	46.67
05.	Dhyya	12.43
Khaliajuri		
01.	Chayma	52.96
02.	Hogli	37.41
03.	Atra	12.51
Sylhet		
01.	Mehdi	64.37
02.	Bharaura	46.38
03.	Kola	26.37
04.	Dobhgi	56.27
05.	Badaura	11.55
06.	Haula	69.90
07.	Chainla	34.48

Table H.4: List of *Beels* in Project area (Cont'd)

Sl. No.	Name of *Beel*	Area (ha)
Habiganj		
01.	Ratna	52.66
02.	Joynoa	36.85
03.	Beriganj	27.95
Lakhai		
01.	Gol	28.81
02.	Garbanga	40.74
03.	Chanpur	63.54
04.	Barachor	17.44
05.	Koail	27.84
06.	Dhaskananai	29.93
07.	Beghnai	24.54
08.	Tin	20.89
09.	Satbila	7.17
Biswanath		
01.	Chanladhuni	32.95
02.	Jangalkuri	93.55
03.	Gowa	7.81

Table H.5: List of Major *Beels* (over 50 ha) in Project Area

Sl. No.	Name of *Beel*	Area (ha.)
01.	Gordair	72.87
02.	Shankora danga	68.67
03.	Haria	50.14
04.	Kanchu	82.30
05.	Shosha	70.36
06.	Haralirgop	79.09
07.	Bhuiya	95.68
08.	Lamba	86.17
09.	Jurakhura	85.30
10.	Udgal	89.15
11.	Blanda	72.53
12.	Gacherdoba	66.38
13.	Phankai	58.56
14.	Beri	66.67
15.	Dhubaria	163.70
16.	Bara chatal	98.14
17.	Majail	84.57
18.	Rauliya	62.69
19.	Chatal	56.59
20.	Balibari	223.41
21.	Dhyalanka	94.50
22.	Katra	145.20
23.	Kalashma	182.23
24.	Kantral	124.43
25.	Chaptai	86.39
26.	Raog	183.69
27.	Banaiya	90.69
28.	Mandarkura	268.98

Table H.5: List of Major *Beels* (over 50 ha) in Project Area (Cont'd)

Sl. No.	Name of *Beel*	Area (ha.)
29.	Philba	146.65
30.	Kharua	76.32
31.	Kariya	57.23
32.	Paraya	58.10
33.	Bandra	119.96
34.	Channa	60.54
35.	Borogop	513.73
36.	Changa	59.12
37.	Chalna	125.33
38.	Gayber	86.92
39.	Chayma	52.96
40.	Mehdi	64.37
41.	Dobhgi	56.27
42.	Haula	69.90
43.	Ratna	52.66
44.	Chanpur	63.54
45.	Jangalkuri	93.55
46.	Bheramohna	232.02
47.	Atrai	99.08

Table H.6: Inventory of Ponds in Project area

Thana	Total Pond		Type of Pond					
			Cultured		Culturable		Derelict	
	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)	No.	Area (ha)
Ajmiriganj	1624	125.86	286	27.93	559	38.86	779	59.10
Baniachang	4439	343.65	781	75.65	1527	105.75	2130	162.38
Nabiganj	3281	254.15	577	55.96	1129	78.28	1574	120.01
Derai	2196	170.02	386	37.47	755	52.37	1054	80.24
Jagannathpur	2590	200.38	455	44.23	891	61.80	1243	94.43
Sulla	1694	131.08	298	29.01	583	40.32	813	61.79
Moulvibazar	119	9.21	21	2.03	40	2.84	57	4.34
Balaganj	3470	268.59	611	59.23	1194	82.68	1665	126.79
Fenchuganj	527	62.04	93	8.93	181	12.54	252	19.34
Golabganj	821	54.09	144	13.93	282	19.63	493	30.10
Astagram	2627	294.90	1598	227.00	643	43.12	386	25.39
Mitamain	1370	153.64	832	117.95	336	22.31	201	13.44
Itna	970	108.73	590	83.55	238	15.92	48	9.29
Nikli	38	4.28	23	3.29	9	0.62	6	0.37
Khaliajuri	216	24.15	131	18.55	53	3.54	32	2.06
Sylhet	1672	126.69	294	28.61	575	39.81	802	61.01
Habiganj	359	27.80	63	6.16	124	8.55	173	13.09
Lakhai	932	72.08	164	15.80	320	22.08	447	34.21
Biswanath	454	35.16	80	7.78	155	10.78	217	16.60
Total	**29,399**	**2,466.5**	**7,427**	**863.06**	**9,594**	**661.80**	**12,372**	**933.98**
Percentage			25.2	34.9	32.6	26.8	42.0	37.8

Table H.7: Fish Species Recorded in the Project Area during 1995-96

Family	Local name	English name	Scientific name
Anguillidae	*Bamosh*	Freshwater eel	Anguilla bengalensis
	Bamosh	Freshwater eel	Ophisternon bengalensis
Tetradontidae	*Potka*	Puffer	Tetraodon cutcutia
Belonidae	*Kaikka*	Needle fish	Xenentodon cancila
Channidae	*Chang*	Snakehead	Channa gachua
	Gozar	Snakehead	Channa marulius
	Shole	Snakehead	Channa striatus
	Taki	Snakehead	Channa punctatus
Cyprinodontidae	*Kanpona*	Top-minnows	Aplocheilus panchax
Cyprinidae	*Bata*	Carp	Labeo bata
	Carpio	Carp	Cyprinus carpio
	Catla	Carp	Catla catla
	Chela	Barb	Salmostoma phulo
	Chela	Barb	Salmostoma bacaila
	Darkina	Barb	Esomus danricus
	Dhela	Barb	Rohtee cotio
	Gonia	Carp	Labeo gonius
	Kalibaush	Carp	Labeo calbasu
	Lachu	Carp	Cirrhinus reba
	Mola	Barb	Amblypharyngodon mola
	Mrigal	Carp	Labeo mrigala
	Piali	Berb	Aspidoparia morar
	Puti	Barb	Puntius sophore
	Puti	Barb	Puntius sarana
	Puti	Barb	Puntius ticto
	Rui	Carp	Labeo rohita
	Silver carp	Carp	Hypophthalmichthys molitrix
	Kashkauri	Barb	Danio devario
Cobitidae	*Bhole*	Minnows	Barilius bola
	Gutum	Loach	Lepidocephalus guntea
	Pahari gutum/B	Loach	Somileptes gongota
	Rani	Loach	Botia dario
Siluridae	*Boal*	Freshwater shark	Wallago attu
	Pabda	Catfish	Ompok bimaculatus
	Pabda	Catfish	Ompok pabda
Schilbeidae	*Pangash*	Catfish	Pangasius pangasius
Heteropneustidae	*Shing*	Catfish	Heteropneustes fossilis
Clariidae	*Magur*	Catfish	Clarias batrachus
Mugilidae	*Khorsolla*	Mullet	Rhinomugil corsula
Chacidae	*Chaka*	Catfish	Chaca chaca
Schibeidae	*Bacha*	Catfish	Eutropiichthys vacha
	Batashi	Catfish	Pseudeutropius atherinoides
	Garua	Catfish	Clupisoma garua
	Kazoli	Catfish	Ailia coila

Table H.7: Fish Species Recorded in the Project Area during 1995-96 (Contd.)

Family	Local name	English name	Scientific name
Bagridae	*Air*	Catfish	Aorichthys aor
	Bazari Tangra	Catfish	Mystus tengara
	Gang tengra	Catfish	Gagata youssoufi
	Guizza	Catfish	Mystus Seenghala
	Gulsha	Catfish	Mystus cavasius
	Rita	Catfish	Rita rita
	Tangra	Catfish	Mystus vittatus
Notopteridae	*Chitol*	Knife fish	Notopterus chitala
	Foli	Knife fish	Notopterus notopterus
Clupidae	*Chapila*	Sardine	Gudusia chapra
	Ilish	Hilsha	Hilsa ilisha
	Ketchki	Sardine	Corica soborna
Mastacembelidae	*Baim*	Spiny eel	Mastacembelus armatus
	Guchi baim	Spiny eel	Mastacembelus pancalus
	Tara baim	Spiny eel	Macrognathus aculeatus
Anabantidae	*Boicha*	Gouramy	Colisa sota
	Kholisha	Gouramy	Colisa fasciatus
	Koi	Perches	Anabas testudineus
	Naptani	Gouramy	Ctenops nobilis
Scianidae	*Poa/Moa*	Croaker	Johnius cujus
Gobidae	*Baila*	Goby	Glossogobius giuris
Nandidae	*Bheda*	Mud perch	Nandus nundus
Ambasiidae	*Chanda*	Glassfish	Chanda nama
	Chanda	Glassfish	Chanda ranga
Pristolepidae	*Napit koi*	Perch	Badis badis
Palaemonidae	*Golda chingri*	Giant Freshwater Prawn	Macrobrachium rosenbergii
	Icha	Prawn	Macrobrachium sp.

Table H.8: List of Fishing Gears and Crafts Used in the Project Area

Habitat	Fishing Gear	Fishing Craft
River	*Vata jal*, Current *jal*, *Jhaki jal*, *Shangla jal*, *Uther jal*, *Ilish jal*, *Veshal jal*, *Deol jal*, *Thella jal*, *Icher chai*, Floating *Veshal*, *Moi jal*, *Pail ber jal*, *Fash jal*, *Ber jal*, *Tana borshi*, *Hazari borshi*, *Horga*, Hand fishing, *Katha*.	*Dingi* boat, Joint *dingi*, *Kosha* boat, *Halder* boat, Joint *halder*, *Bachari* boat, *Raft*.
Duar	*Uther jal*, *Vata jal*, *Fash jal*, *Ber jal*, *Shangla jal*, *Jhaki jal*, Current *jal*, *Veshal jal*, *Pail ber jal*, *Borshi*, *Tana borshi*	*Dingi* boat, Joint *dingi*, Joint *halder* boat, *Bachari* boat.
Canal/ *Khal*	*Jhaki jal*, *Thella jal*, *Current jal*, *Ber jal*, *Moi jal*, *Uther jal*, Hand fishing, *Borshi*.	*Dingi* boat, *Kosha* boat.
Beel	*Thella jal*, *Jhaki jal*, *Polo*, *Current jal*, *Ber jal*, *Katha*, *Ichar chai*, *Tana borshi*, *Borshi*, *Deol jal*, *Moi jal*, *Koch*.	*Dingi* boat, *Bachari* boat, *Koaha* boat, *Raft*.
Flood plain	*Jhaki jal*, *Thella jal*, *Ichar chai*, *Borshi*, *Tana borshi*, *Ilish jal*, *Deol jal*, *Current jal*, *Ber jal*.	*Dingi* boat, *Bachari* boat.
Pond	*Ber jal*, *Jhaki jal*, *Dharma jal*, *Borshi*.	*Kosha* boat, *Dingi* boat.

Table H.9. Number of Fishers and Fishing Households

Sl. No.	*Thana*	No. of Fishermen	No. of Households
1	Ajmiriganj	17,340	3,828
2.	Baniachang	48,470	10,700
3.	Nabiganj	32,740	7,228
4.	Derai	44,800	9,890
5.	Jagannathpur	51,600	11,390
6.	Sullah	55,000	12,141
7.	Moulvibazar	5,800	1,280
8.	Balaganj	34,000	7,780
9.	Fenchuganj	28,300	6,248
10.	Golabganj	17,500	3,863
11.	Astagram	20,000	4,450
12.	Mitamain	32,700	7,035
13.	Itna	27,000	5,960
14.	Sylhet	22,450	4,950
15.	Habiganj	17,300	3,844
16	Lakhai	37,400	8,250
17	Nikli	15,400	4,190
18	Biswanath	34,839	6,723
Total		542,639	119,750

Table H.10: DOF Nominal Fish Production Data - Total Catch
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	3,668	1,234	755	5,657
1984/85	2,639	1,677	1,853	6,169
1985/86	5,679	872	3,058	9,609
1986/87	5,200	632	2,292	8,124
1987/88	3,732	607	2,662	7,001
1988/89	6,347	1,025	1,806	9,178
1989/90	2,895	849	1,595	5,339
1990/91	3,320	1,164	56	4,540
1991/92	3,437	1,178	58	4,673
1992/93	2,509	1,020	33	3,562

Table H.11: DOF Nominal Fish Production Data - Species Composition
(Upper Meghna River)

Year	Major carp (tonnes)	Other carp (tonnes)	Catfish (tonnes)	Snakeheads (tonnes)	Livefish (tonnes)	*Ilish* (tonnes)	*Golda chingri* (tonnes)	*Icha* (tonnes)	Micellaneous (tonnes)	Total (tonnes)
1983/84	280	87	134	-	48	1,287	647	-	3,174	**5,657**
1984/85	175	107	165	-	-	1,133	839	984	2,766	**6,169**
1985/86	334	44	243	-	-	1,748	81	1,295	5,864	**9,609**
1986/87	-	13	11	-	-	2,013	20	813	5,254	**8,124**
1987/88	-	-	-	-	-	2,210	38	602	4,151	**7,001**
1988/89	33	58	98	-	-	4,064	112	879	3,934	**9,178**
1989/90	49	182	213	-	-	1,810	1	1,028	2,056	**5,339**
1990/91	579	170	417	1	-	719	132	716	1,806	**4,540**
1991/92	322	105	475	-	-	764	85	867	2,055	**4,673**
1992/93	173	55	225	-	-	539	45	917	1,608	**3,562**

Table H.12: DOF Nominal Fish Production Data - Major Carp
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	182	61	37	280
1984/85	80	58	37	175
1985/86	220	-	114	334
1986/87	-	-	-	-
1987/88	-	-	-	-
1988/89	7	-	26	33
1989/90	4	23	22	49
1990/91	545	32	2	579
1991/92	301	21	-	322
1992/93	159	14	-	173

Table H.13: DOF Nominal Fish Production Data - Other Carp
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	56	19	12	87
1984/85	25	18	64	107
1985/86	16	-	28	44
1986/87	-	-	13	13
1987/88	-	-	-	-
1988/89	-	37	21	58
1989/90	1	104	77	182
1990/91	89	80	1	170
1991/92	49	56	-	105
1992/93	21	34	-	55

Table H.14: DOF Nominal Fish Production Data - Catfish
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	87	29	18	134
1984/85	38	27	100	165
1985/86	151	-	92	243
1986/87	9	-	2	11
1987/88	-	-	-	-
1988/89	-	47	51	98
1989/90	-	115	98	213
1990/91	299	113	5	417
1991/92	363	112	-	475
1992/93	195	30	-	225

Table H.15: DOF Nominal Fish Production Data - *Ilish*
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	834	281	172	1,287
1984/85	521	263	349	1,133
1985/86	1,139	-	609	1,748
1986/87	1,564	-	449	2,013
1987/88	1,775	-	435	2,210
1988/89	3,607	-	457	4,064
1989/90	1,328	-	482	1,810
1990/91	698	-	21	719
1991/92	739	-	25	764
1992/93	532	-	7	539

Table H.16: DOF Nominal Fish Production Data - *Golda chingri*
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	420	141	86	647
1984/85	417	239	183	839
1985/86	38	25	18	81
1986/87	20	-	-	20
1987/88	-	12	26	38
1988/89	49	-	63	112
1989/90	1	-	-	1
1990/91	46	86	-	132
1991/92	85	-	-	85
1992/93	45	-	-	45

Table H.17: DOF Nominal Fish Production Data - *Icha*
(Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	-	-	-	-
1984/85	269	304	411	984
1985/86	478	545	272	1,295
1986/87	220	211	382	813
1987/88	162	131	309	602
1988/89	208	274	397	879
1989/90	279	298	451	1,028
1990/91	403	308	5	716
1991/92	458	404	5	867
1992/93	435	476	6	917

Table H.18: DOF Nominal Fish Production Data - Miscellaneous Species (Upper Meghna River)

Year	Comila (tonnes)	Mymensingh (tonnes)	Sylhet (tonnes)	Total (tonnes)
1983/84	2,058	692	424	**3,174**
1984/85	1,289	768	709	**2,766**
1985/86	3,637	302	1,925	**5,864**
1986/87	3,407	401	1,446	**5,254**
1987/88	1,795	464	1,892	**4,151**
1988/89	2,476	667	791	**3,934**
1989/90	1,282	309	465	**2,056**
1990/91	1,240	545	21	**1,806**
1991/92	1,442	585	28	**2,055**
1992/93	1,122	466	20	**1,608**

Table H.19: Fish Purchases by Ajmiriganj Fish Industries Ltd.

Group/Species	1985 (kg)	1986 (kg)	1987 (kg)	1988 (kg)	1989 (kg)	1990 (kg)	1991 (kg)
Major Carp							
Rui	3,122	17,930	41,621	61,035	42,635	46,254	12,942
Catla	2,983	2,979	4,055	10,650	12,336	3,818	330
Kalibaush	136	4,749	6,183	15,736	14,884	940	1,372
Mrigel	-	-	313	38	-	-	-
Subtotal:	**6,241**	**25,658**	**52,172**	**87,459**	**69,855**	**51,012**	**14,644**
Large Catfish, Knifefish & Snakeheads							
Air	32,060	45,967	26,069	70,172	24,897	14,682	18,805
Boal	68,445	77,261	37,519	102,636	71,277	21,964	30,384
Pangash	1,123	8	6	1,248	-	-	20
Chitol	4,062	1,669	2,477	3,614	793	633	802
Gazar	753	2,441	194	2,150	-	279	185
Shoal	619	223	1,719	5,425	-	158	2,034
Subtotal:	**107,062**	**127,569**	**67,984**	**185,245**	**96,967**	**37,716**	**52,230**
Large finfish	**113,303**	**153,227**	**120,156**	**272,704**	**166,822**	**88,728**	**66,874**
Small Catfish							
Pabda	46,124	15,652	6,669	21,570	49,179	11,026	27,448
Bacha	486	540	610	6,608	4,361	721	1,002
Tengra	4,930	2,078	249	1,500	875	1,847	3,364
Batashi	5,124	1,439	7,010	8,193	4,273	4,828	1,082
Magur	7	205	980	4,294	14	-	770
Bashpata	-	-	497	1,124	-	146	4
Garua	-	-	-	27	-	-	-
Shilon	-	-	205	101	91	-	-
Shingi	-	-	-	521	-	-	-
Kazoli	-	-	-	1,574	748	3,561	2,125
Subtotal:	**56,671**	**19,914**	**16,220**	**45,512**	**59,541**	**22,129**	**35,795**
Other Small Species							
Ketshki	8,699	2,718	12,983	17,180	2,042	8,474	12,491
Chapila	85	240	147	902	1,155	1,416	4,380
Meni	384	-	4,670	1,112	235	8	55
Koi	81	1,263	8,420	1,751	120	2,884	1,300
Kaikka	559	43	1,405	3,190	-	-	332
Baim	456	856	8,222	6,545	2,058	4,142	3,789
Tara baim	-	-	1,495	9,770	-	-	-
Taki	237	29	1,542	2,958	-	-	11
Gonia	-	-	2,452	3,494	-	-	-
Lachu	-	-	2,640	1,584	433	-	1,430
Mola	-	-	225	2,701	-	50	737
Chela	-	-	-	161	-	160	-
Puti (large)	96	728	-	2,769	-	-	-
Puti (small)	-	-	6,979	2,557	-	21	573
Kanla	-	-	-	574	-	490	-
Rani	42	-	3,348	6,428	2,224	6,036	4,219
Gutum	-	-	161	845	2,808	1,622	-
Chanda	-	-	-	103	-	-	-
Subtotal:	10,639	5,877	54,689	64,624	11,075	25,303	29,317
Small finfish	**67,310**	**25,791**	**70,909**	**110,136**	**70,616**	**47,432**	**65,112**
Summary Data							
Finfish	180,613	179,018	191,065	382,840	237,438	136,160	131,986
Golda chingri	137,964	105,067	76,085	193,642	121,750	180,525	201,334
Total	**318,577**	**284,085**	**267,150**	**576,482**	**359,188**	**316,685**	**333,320**

Table H.20: Fisheries Products Exported during 1983-92 by Ajmiriganj Fish Industries Ltd.

Year	Quantity (kg)				Value (Tk)			
	Prawns	Finfish	Froglegs	Total	Prawns	Finfish	Froglegs	Total
1983	107,136	68,122		175,258	18,508,300	1,780,500		**20,288,800**
1984	93,147	229,402		322,549	17,875,200	20,241,300		**38,116,500**
1985	116,045	110,784	33,677	260,506	18,120,300	6,146,300	4,259,500	**28,526,100**
1986	113,280	96,192	101,030	310,502	18,064,200	5,892,300	11,055,000	**35,011,500**
1987	46,618	157,325	90,470	294,413	9,709,300	11,839,100	14,409,000	**35,957,400**
1988	158,861	257,280	91,046	507,187	38,758,800	22,059,400	18,689,000	**79,507,200**
1989	108,058	279,091	65,779	452,928	22,632,592	12,663,317	11,215,632	**46,511,541**
1990	168,960	141,850		310,810	42,931,324	11,831,449		**54,762,773**
1991	159,590	133,824	81,216	374,630	50,166,147	12,981,304	19,074,900	**82,222,351**
1992	94,272	168,077		262,349	23,744,138	19,103,260		**42,847,398**

Table H.21: Product Prices for a Fish Shipment by Ajmiriganj Fish Industries Ltd.

(Example of a shipment of finfish to UK, dated 28 January 1993, cif Chittagong.)

Product Form species	Master Cartons * no.	Weight (kg)	Value (Tk)	Price per kg (cif) (Tk)	(UK Pound)
Frozen Block					
Pabda	150	2,730	325,000	119	1.98
Rui	30	546	80,000	147	2.42
Air	65	1,183	174,000	147	2.42
Boal	92	1,674	179,000	107	1.76
Ketchki	37	673	45,000	67	1.10
Lachu	1	18	1,000	56	1.32
Sarputi	1	18	2,000	111	1.43
Kazoli	2	36	3,000	83	1.32
Bacha	24	437	47,000	108	1.76
Chapila	3	55	4,000	73	1.10
Batashi	22	400	27,000	68	1.10
Tengra	80	1,456	137,000	94	1.54
Kaikka	92	1,674	146,000	87	1.43
Individual Quick Frozen					
Rui	117	2,129	313,000	147	2.42
Boal	126	2,293	245,000	107	1.76
Air	142	2,584	380,000	147	2.42
Catla	2	36	4,000	111	1.76
Kalibaush	20	364	39,000	107	1.76
Gonia	1	18	2,000	111	1.54
Ilish (1.2-1.5 k	463	8,427	733,000	87	1.43
Ilish (1-5+ kg)	52	946	82,000	87	1.43
Total/average	1522	27,697	2,968,000	107	1.76

Notes: * Standard size cartons of 40 lb (= 18.2 kg).

Exchange rates: UK Pound = Tk 60.80, US$ = Tk 39.

The total value of this shipment of 27.7 tons of mixed freshwater finfish is Tk 29,68,000 (UK Pounds 48,816, or US$ 76,102)

Table H.22: Fishery Products Exported during 1986-95
by Kuliarchar Cold Storage Ltd.

Year	Quantity (tonnes)			Value (Million Tk)		
	Prawns	Finfish	Total	Prawns	Finfish	Total
1986	79.4	635.2	714.6	15.88	63.52	79.40
1987	96.6	1,042.7	1,139.3	19.32	109.48	128.80
1988	181.0	1,381.8	1,562.8	38.00	152.00	190.00
1989	134.0	1,260.0	1,394.0	28.80	151.20	180.00
1990	158.2	1,379.0	1,537.3	34.81	158.59	193.40
1991	274.2	1,508.1	1,782.3	60.33	180.98	241.30
1992	334.3	1,435.3	1,769.6	76.89	179.41	256.30
1993	464.6	2,001.5	2,466.1	111.51	260.19	371.70
1994	629.7	2,088.4	2,718.1	157.43	292.37	449.80
1995	632.0	2,034.5	2,666.5	164.33	305.18	469.50

Table H.23: Species Composition in Kushiyara River (107)

Group/Species	Monthly catch (Kg)											
	Nov 95	Dec 95	Jan 96	Feb 96	Mar 96	Apr 96	May 96	Jun 96	Jul 96	Aug 96	Sep 96	Oct 96
Major carp												
Rui	39.5	15.6	16.5	37.6	79.9	152.1	174.7	80.1	21.1	31.0	56.3	61.0
Catla	0.0	5.2	2.7	3.6	6.7	12.2	14.0	3.1	0.0	1.0	1.4	1.5
Kalibaush	27.1	23.5	18.6	41.2	94.2	136.9	157.2	66.8	26.3	29.0	47.9	51.8
Mrigel	0.0	0.0	1.2	1.8	2.2	7.3	8.4	0.0	0.0	0.0	0.0	0.0
a. Subtotal	66.6	44.3	39.0	84.1	183.0	308.5	354.2	149.9	47.4	61.0	105.6	114.3
Introduced carp												
Common carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Grass carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Silver carp	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0
b. Subtotal												
Large catfish, Knifefish, Snakeheads and others												
Air	33.9	22.8	22.2	62.6	124.4	115.6	132.7	40.1	18.4	22.3	35.2	38.1
Boal	113.0	71.7	35.1	122.6	233.2	372.4	427.5	157.2	72.3	82.2	126.8	137.2
Chitol	6.8	5.2	4.5	13.5	20.0	30.4	34.9	13.4	4.4	4.8	8.5	9.2
Foli	4.5	3.3	3.9	15.0	35.5	36.5	41.9	15.3	7.0	3.9	5.6	6.1
Gonia	3.4	2.0	0.0	4.5	4.4	15.2	17.5	0.4	0.0	2.9	4.2	4.6
Lachu	45.2	26.1	12.9	37.6	81.3	127.8	146.7	80.1	31.6	34.8	56.3	61.0
Ilish	350.2	97.7	33.0	153.9	453.0	754.5	936.1	705.8	359.6	448.9	653.5	676.9
c. Subtotal	**556.9**	**228.7**	**111.6**	**409.6**	**951.7**	**1,452.5**	**1,737.4**	**1,012.1**	**493.2**	**599.9**	**890.2**	**933.0**
A. Intertotal large finfish	**623.5**	**273.0**	**150.6**	**493.7**	**1,134.7**	**1,761.0**	**2,091.6**	**1,162.0**	**540.6**	**660.8**	**995.8**	**1,047.3**
Small catfish												
Bacha	154.7	97.7	36.9	112.7	329.5	471.6	541.4	351.0	161.4	179.0	249.3	269.8
Garua	186.4	106.9	43.2	96.6	325.1	502.0	506.5	352.5	179.6	198.3	260.6	312.5
Rita	22.6	13.0	13.2	31.8	82.2	143.0	164.2	66.8	17.5	23.2	28.2	30.5
Tengra	33.9	35.8	12.0	39.4	98.6	79.1	90.8	49.6	22.8	19.4	28.2	30.5
Gulsha	28.2	32.6	13.2	34.0	77.7	91.3	104.8	47.7	20.2	13.6	19.7	21.3
Batashi	33.9	15.6	15.6	31.3	68.0	116.8	134.1	55.3	25.4	29.0	42.3	45.7
Kazoli	124.3	95.8	20.5	63.5	163.4	231.2	265.5	152.6	70.2	99.7	145.1	157.0
d. Subtotal	**584.0**	**397.4**	**154.6**	**409.3**	**1,144.5**	**1,635.1**	**1,807.3**	**1,075.5**	**497.1**	**562.1**	**773.3**	**867.4**
Other small species												
Puti	61.0	32.6	17.4	52.8	91.5	99.8	114.6	62.6	28.8	29.0	42.3	45.7
Chapila	79.1	48.9	24.6	59.9	127.0	156.4	179.5	105.3	48.4	58.1	84.5	91.5
Chela	28.2	15.6	11.5	30.8	63.1	74.2	85.2	42.4	19.5	22.3	32.4	35.1
Mola	39.5	22.8	11.6	29.5	76.4	115.6	132.7	72.5	31.6	29.0	42.3	45.7
Dhela	18.1	10.4	3.2	12.5	33.3	51.7	59.4	32.4	14.9	15.5	22.5	24.4
Bata	33.9	15.6	11.2	25.9	55.1	79.1	90.8	49.6	22.8	23.2	28.2	30.5
Taki	14.7	15.0	10.2	26.8	57.7	43.8	50.3	17.2	7.9	8.7	12.7	13.7
Ketchki	33.9	19.6	4.5	14.3	42.6	34.1	39.1	19.1	8.8	12.6	21.1	22.9
Rani	26.0	15.0	9.6	28.6	74.6	108.3	124.4	45.8	19.3	22.3	32.4	35.1
Poa	18.1	5.2	5.7	17.0	40.0	66.9	76.9	42.0	19.3	15.5	22.5	24.4
Jainzza	79.1	35.2	22.2	61.5	158.1	219.1	251.5	137.3	63.1	61.9	90.1	97.6
Khorsula	22.6	15.6	5.2	15.2	35.5	57.8	66.4	36.2	16.7	15.5	22.5	24.4
Chanda	33.9	22.2	13.2	38.5	105.7	130.8	150.2	57.2	26.3	29.0	42.3	45.7
Baim	16.9	11.1	8.8	27.2	53.3	51.7	59.4	21.0	9.7	9.7	21.3	22.9
Matibangra	5.7	3.3	0.0	0.0	0.0	12.2	14.0	7.6	3.5	3.9	5.6	6.1
Misc.	423.6	244.3	99.0	326.4	781.6	958.4	1,100.3	625.3	285.6	251.6	366.2	396.4
e. Subtotal	**934.1**	**532.3**	**257.9**	**767.0**	**1,795.5**	**2,260.0**	**2,594.6**	**1,373.4**	**626.0**	**607.6**	**889.0**	**962.0**
B. Intertotal small finfish	**1,518.1**	**929.7**	**412.6**	**1,176.3**	**2,940.0**	**3,895.0**	**4,401.9**	**2,448.9**	**1,123.1**	**1,169.7**	**1,662.2**	**1,829.4**
Prawns												
Golda chingri	49.7	15.6	2.0	9.0	48.9	106.5	122.3	82.0	39.5	48.4	77.5	83.9
Icha	67.8	84.7	34.8	110.0	317.5	322.5	370.3	122.1	50.9	56.1	81.7	88.4
Total Prawns	117.5	100.3	36.8	119.0	366.4	429.0	492.5	204.1	90.3	104.5	159.2	172.3
Summary Data												
Finfish (A+B)	2,141.6	1,202.7	563.2	1,670.1	4,074.6	5,656.0	6,493.5	3,610.9	1,663.7	1,830.6	2,658.1	2,876.7
Prawns	117.5	100.3	36.8	119.0	366.4	429.0	492.5	204.1	90.3	104.5	159.2	172.3
Grand total	**2,259.0**	**1,303.0**	**600.0**	**1,789.0**	**4,441.0**	**6,085.0**	**6,986.0**	**3,815.0**	**1,754.0**	**1,935.0**	**2,817.0**	**3,049.0**

Table H.24: Species Composition in Kalni River (100)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp													
Rui	13.7	44.3		28.9		47.0							
Catla								41.7					
Kalibaush		76.5	121.1		44.7	200.0	100.0	98.0					
Mrigel													
a. Subtotal	13.7	120.8	121.1	28.9	44.7	247.0	100.0	139.7					
Exotic													
Common carp								40.0					
Grass carp													
Silver carp													
b. Subtotal								40.0					
Large catfish, Knifefish, Snakeheads and others													
Air	120.3	33.3		28.9	40.3	430.0	32.5	31.7			121.6		
Boal	87.0	30.3		57.8	30.2	130.0	47.0	60.0	56.0	43.0	48.0		
Bagair													
Chitol						135.0							
Foli			17.2	36.2	19.3		23.7		24.0			18.0	
Gozar						242.0							
Shole													
Gonia													
Lachu	45.8		51.6	115.7	60.4	121.5	23.6	40.1	38.0	32.8		31.7	
Ilish	99.5	40.3	34.4	28.9	17.1		43.8	40.4	46.5	37.0	88.4	35.7	364.0
c. Subtotal	382.6	103.8	103.3	267.5	167.3	1,058.5	170.6	172.2	164.5	112.8	258.0	85.4	364.0
A. Intertotal large finfish	366.4	224.6	224.4	296.4	212.0	1,305.5	270.6	351.9	164.5	112.8	258.0	85.4	364.0
Small catfish													
Pabda	27.5	37.3	34.4	72.3	24.2	42.0	17.0		28.2	23.5		24.8	49.3
Bacha	18.3		34.4	14.5		70.1					90.1		
Garua	27.5		120.5										
Rita		35.4	17.2					42.7					
Tengra		133.0	206.6	144.6	51.3	67.0	41.6	48.9	40.2	43.0		41.2	22.0
Gulsha		123.0	258.2	43.4	44.3	70.9	23.0	31.0	17.0	23.0	139.5	60.5	71.4
Batashi		55.4			13.3		10.0	13.4	13.4	27.0		25.6	19.2
Magur													
Shing													
Kazoli		20.2	17.2		15.7								
d. Subtotal	73.3	404.2	688.5	274.7	148.8	250.0	91.6	136.0	98.8	116.5	229.6	152.1	161.9
Other small species													
Puti		155.3		101.2	47.1		19.6	60.3	60.1	49.8	103.0	60.0	55.0
Chapila	18.3	136.0	137.7	101.2	50.1		20.8	44.0	31.0	25.0	194.4	23.6	36.6
Chela		110.8	34.4	57.8	18.7	37.0		35.0	13.0	15.0	89.1	70.0	28.6
Mola											38.4		
Dhela			17.2										
Bata													
Taki									31.7		71.8	57.1	74.1
Ketchki													
Rani													
Bele			51.6	115.7		165.0		73.3	48.0	44.3		23.7	
Kashkauri			17.2							14.7			
Khorsula				28.9									
Chanda		77.6	51.6	43.4	19.1		11.0	12.0	21.3	18.7		21.0	
Baim			103.3	144.6	39.3	70.3	28.6	32.0	35.6	29.0		27.0	
Guchi			223.7	72.3		226.7	27.1	60.1	33.0	25.8		30.0	
moa				7.2									
chaka				14.5									
veda				43.4									
Balichata										13.2			
Gutum									18.0	13.4		33.6	
e. Subtotal	18.3	479.6	636.8	730.2	174.3	499.0	107.1	316.7	291.7	248.9	496.7	346.0	194.4
B. Intertotal small finfish	91.6	883.8	1,325.3	1,005.0	323.1	749.0	198.7	452.7	390.5	365.4	726.3	498.1	356.3
Chingri													
Golda						50.7	50.0	52.0	12.0	13.5		73.0	60.0
Icha			171.5	144.6	68.8	18.0	17.3	19.0	27.0	12.0		17.8	35.0
Total chingri			171.5	144.6	68.8	68.7	67.3	71.0	39.0	25.5		90.8	95.0
Summary Data													
Finfish (A+B)	458.0	1,108.5	1,549.7	1,301.4	535.0	2,054.5	469.3	804.6	555.0	478.2	984.3	583.5	720.3
Chingri	0.0	0.0	171.5	144.6	68.8	68.7	67.3	71.0	39.0	25.5	0.0	90.8	95.0
Grand total	457.9	1,108.0	1,721.2	1,446.0	603.9	2,123.2	536.6	875.6	594.0	503.7	984.3	674.3	815.3

Table H.25: Species Composition in Kalni River (101)

Group/Species	Monthly catch (Kg)																		
	Feb95	Mar95	Apr95	May95	Jun95	Jul95	Aug95	Sep95	Oct95	Nov95	Dec95	Jan96	Feb96	Mar96	Apr96	May96	Jun96	Jul96	Aug96
Major Carp																			
Rui	111.6	81.9	200.0		94.7		217.4			317.6	647.9		123.9			499.0			
Catla							155.0				554.1		85.0						
Kalibaush		229.7			189.5				47.9	79.0	712.9	661.9	70.5	280.0			526.2		217.1
Mrigel					142.1	200.0			119.9			15.7							
a. Subtotal	**111.6**	**311.5**	**200.0**		**426.3**	**200.0**	**372.4**		**167.8**	**396.6**	**1,914.9**	**677.6**	**279.4**	**280.0**		**499.0**	**526.2**		**217.1**
Exotic																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air	557.9		252.0		284.2		200.3	35.2		53.9	686.3	282.0	105.0	142.8		279.1	193.9	179.0	114.5
Boal	558.9	469.3	500.0		331.5			272.0	430.3	423.6	900.0	1,791.3	1,430.0	1,500.0	268.1	536.7	360.1	471.3	226.9
Bagair	113.6		152.1								782.9		83.5					526.6	
Chitol	200.0		75.0							300.0	252.3	196.4		125.3	255.3				
Foli			130.4							45.5									
Gozar												102.4			10.6				
Shole											130.0	39.0							
Gonia	167.4		230.4									20.8	107.8		484.6		72.7	185.1	61.2
Lachu				151.4	199.5				98.4				70.0		151.9	369.2	498.5	522.1	874.0
Ilish		101.9	86.9	605.6	1,657.6	800.0	604.0	754.4	64.6	123.7				1,768.1	1,170.5	1,184.9	1,125.2	1,884.0	1,276.6
c. Subtotal	**1,597.8**	**571.2**	**1,426.9**	**757.1**	**2,472.8**	**800.0**	**804.3**	**1,061.6**	**593.2**	**946.7**	**2,751.6**	**2,431.7**	**1,796.3**						
A. Intertotal large finfish	**1,709.4**	**882.7**	**1,626.9**	**757.1**	**2,899.0**	**1,000.0**	**1,176.7**	**1,061.6**	**761.1**	**1,343.3**	**4,666.5**	**3,109.3**	**2,075.7**	**2,048.1**	**1,170.5**	**1,683.9**	**1,651.4**	**1,884.0**	**1,493.7**
Small catfish																			
			130.4	171.4	142.1	290.0	84.6	5.2	55.3	47.9	48.3	8.0	15.7	72.5	41.2		28.5	59.0	130.2
Bacha	279.0	229.7	304.3				74.6		50.8	58.1	32.9	16.8	79.3				27.3	68.7	61.2
Garua		329.7	329.3		179.5		135.0		43.0		27.1	10.6	102.0				26.7	21.7	39.4
Rita									16.7										
Tengra	557.9	449.3	452.1	196.8	473.6		162.2		68.2	62.6	19.1	65.4	170.8	159.7	129.2	63.7	43.3	115.6	
Gulsha	835.9	689.0	300.1	161.7	331.5		314.1	8.7	168.7	154.7	26.0	49.5	107.3	166.5	179.4	35.5	28.0	14.9	
Batashi		321.5					96.6	1.8	62.8	11.4	54.1		81.0	70.0	128.5		8.7		
Magur																			
Shing									26.2										
Kazoli							94.6		116.3	148.1	62.3		23.0		134.0		69.3	29.1	
d. Subtotal	**1,672.8**	**2,019.1**	**1,516.2**	**529.9**	**1,126.7**		**961.6**	**15.7**	**608.1**	**482.9**	**269.9**	**150.3**	**579.1**	**468.7**	**612.3**	**99.1**	**231.9**	**309.0**	**230.8**
Other small species																			
Puti	446.3	367.4	434.7						34.4	89.1	66.4	124.6	71.8	180.0	61.0	38.2	83.5	27.5	
Chapila	557.9					267.1			81.9	441.0	24.4		205.0	160.0			17.3		
Chela					47.4				3.8	27.1	10.1	14.9			75.0		20.4		
Mola																	50.4	6.8	
Dhela		37.8													22.2				
Bata											3.7	7.7		107.0	20.2	17.2			
Taki														63.4			9.0		
Ketchki															57.1				
Rani							193.3		53.0	58.1		7.7	82.6	123.4	30.6	106.6	11.0		
Bele	502.1										1.6				6.6	1.0	18.0		
Gang tengra																			
Khorsula												6.9			74.3	5.0	14.6		
Chanda		129.7					84.7	1.0											
Baim	277.0		465.2						124.1	112.0	215.5	213.8	287.0	295.0	58.1	40.7	5.4		
Guturn		329.7									1.0					22.0			
Tara baim													48.0	187.5		13.7			
Fasha										181.3				40.3	48.7	4.5	44.3	29.8	
Kakila															62.4				
Kaskauri		92.1													8.0	2.3			
Moa		91.9													19.5				
Crab																23.7			
Guchi		229.7								57.8			123.0	140.0		23.0	5.1		
e. Subtotal	**1,783.4**	**1,278.2**	**899.9**	**0.0**	**47.4**	**267.1**	**278.0**	**1.0**	**297.2**	**966.4**	**322.7**	**375.6**	**817.4**	**1,296.6**	**543.7**	**297.8**	**278.8**	**64.1**	
B. Intertotal small finfish	**3,456.1**	**3,297.2**	**2,416.1**	**529.9**	**1,174.1**	**267.1**	**1,239.6**	**16.7**	**905.2**	**1,449.3**	**592.5**	**525.9**	**1,396.5**	**1,765.3**	**1,156.0**	**396.9**	**510.7**	**373.1**	**230.8**
Chingri																			
Golda					236.8			10.3	100.0	193.3	48.8		124.8	310.0	84.3	391.1	270.8		
Icha	413.7	413.4	304.3	227.1	426.3			3.9	42.3	24.1		7.7	93.0	27.0		24.2			
Total chingri	**413.7**	**413.4**	**304.3**	**227.1**	**663.1**		**0.0**	**14.2**	**142.3**	**217.4**	**48.8**	**7.7**	**217.8**	**337.0**	**84.3**	**415.4**	**270.8**		
Summary Data																			
Finfish (A+B)	5,165.5	4,179.9	4,042.9	1,287.0	4,073.1	1,267.2	2,416.3	1,078.3	1,666.3	2,792.6	5,259.0	3,635.1	3,472.2	3,813.4	2,326.5	2,080.7	2,162.1	2,257.1	1,724.5
Chingri	413.7	413.4	304.3	227.1	663.1	0.0		14.2	142.3	217.4	48.8	7.7	217.8	337.0	84.3	415.4	270.8	0.0	0.0
Grand total	**5,579.2**	**4,593.3**	**4,347.2**	**1,514.1**	**4,736.2**	**1,557.1**	**2,416.4**	**1,092.5**	**1,808.6**	**3,010.0**	**5,307.8**	**3,642.8**	**3,690.0**	**4,150.4**	**2,410.9**	**2,496.1**	**2,432.9**	**2,257.1**	**1,724.5**

Table H.26: Species Composition in Kalni River (104)

Group/Species	Monthly catch (Kg)																		
	Feb--95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																			
Rui	391.0			115.0	68.0						200.1			166.8					300.7
Catla																			
Kalibaush	215.2		116.0		174.1	464.7	225.8				264.9	247.5	170.8	193.8			205.0		
Mrigel					48.0		52.1		33.1			102.3	87.0	102.2	24.0				77.0
a. Subtotal	**606.2**		**116.0**	**115.0**	**290.1**	**464.7**	**277.9**		**33.1**		**465.0**	**349.8**	**257.8**	**462.8**	**24.0**		**205.0**		**377.7**
Exotic																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air	763.6		339.2		145.1		156.3	239.6	256.6	302.4	820.8	170.0	147.5	167.0	240.5	267.3	270.0	236.0	130.9
Boal	943.2	383.0		662.5		497.9	191.1	171.4	232.5	304.1	626.8	348.0	270.6	220.5	282.3	197.4	205.7	270.3	187.0
Bagair			50.9															103.4	
Chitol													81.0					70.0	
Foli																			
Gozar																			
Shole						99.6													
Gonia			135.7								395.5								
Lachu					100.0	166.0				226.8		60.2	148.5	83.0	183.6	99.4	105.7	83.5	51.9
Ilish		139.3	67.8	946.5	1,015.4	1,161.8	382.1	332.3	190.1	204.1	179.1				135.6	87.5	203.4	290.3	943.1
c. Subtotal	**1,706.8**	**522.3**	**593.6**	**1,609.0**	**1,260.1**	**1,925.5**	**729.5**	**743.2**	**679.2**	**1,037.3**	**2,022.1**	**578.2**	**647.6**	**470.5**	**841.9**	**651.6**	**784.8**	**1,053.5**	**1,312.9**
A. Intertotal large finfish	**2,312.9**	**522.3**	**709.6**	**1,724.0**	**1,550.2**	**2,390.2**	**1,007.4**	**743.2**	**712.3**	**1,037.3**	**2,487.1**	**928.0**	**905.4**	**933.3**	**865.9**	**651.6**	**989.8**	**1,053.5**	**1,690.6**
Small catfish																			
Pabda					87.0	166.0	86.9		185.4	162.5		71.0	68.4	48.0	62.5	103.5		157.8	66.6
Bacha						66.4		47.2	139.1		350.7	124.8	67.3					83.6	27.0
Garua		324.2			58.0	132.8		75.2	166.2		270.0	327.0	180.4					117.5	143.6
Rita									99.3		253.7								
Tengra		348.2	243.0		290.1	265.6	208.5	92.7	189.4	162.5	552.2	65.8	73.7	81.2	83.4	127.7	130.4	147.0	
Gulsha	801.0	766.0	300.6	208.1	232.1		139.0	113.7	435.4	370.4	440.2	434.8	278.0	138.0	100.5	193.5	70.5	110.0	
Batashi						99.6				130.4	328.3	123.0	93.0				72.6		
Magur																			
Shing																			
Kazoli						89.6		75.2		185.2	143.0	61.2	43.4				63.5	67.8	
d. Subtotal	**801.0**	**1,438.4**	**543.6**	**208.1**	**377.2**	**819.9**	**434.4**	**404.0**	**1,214.9**	**1,011.1**	**2,338.1**	**1,207.6**	**804.2**	**267.2**	**246.4**	**424.7**	**337.0**	**683.7**	**237.1**
Other small species																			
Puti	500.0	626.7	261.8				173.7	66.5	374.2	287.3	358.2	142.5	67.3	277.3		123.9	140.6	57.3	
Chapila			90.4	377.0		109.3		134.7		128.5	126.9	278.0	190.0	163.0	148.0	163.4	105.0		
Chela					29.0			171.4		247.6		69.3	62.7		53.7	64.8	106.3		
Mola												70.5			37.8	41.0	40.3	50.3	
Dhela												27.8							
Bata															77.0	84.7			
Taki																			
Kechki														155.0	110.4	74.0	63.3		
Rani													43.7						
Bele			180.9					122.4	122.5	262.5	201.5	174.0	103.5	189.2	112.0	173.5	123.4		
Jainzza																			
Khorsula																			
Chanda								63.0				49.7	44.6	42.5	62.7	57.0	70.1		
Baim		522.3	271.3	412.1			69.5		562.9	642.5	1,044.6	430.7	90.0	123.4	134.8	160.7	190.0		
Gutum												123.8	105.6			83.0			
Tara baim											126.9	230.5	60.5	70.0			10.5		
Fasha														12.8		14.8	20.3	12.7	
Guchi												148.9	210.0	190.4	110.5	140.0	125.6		
Kaskauri																23.7			
Kakila											149.2					34.6			
Bhol											74.6								
Kholisha									49.7										
e. Subtotal	**500.0**	**1,149.0**	**804.4**	**789.2**	**29.0**	**109.3**	**243.2**	**557.8**	**1,109.3**	**1,568.4**	**2,081.8**	**1,745.7**	**977.9**	**1,223.6**	**846.8**	**1,239.1**	**995.5**	**120.3**	
B. Intertotal small finfish	**1,301.0**	**3,109.7**	**1,348.0**	**997.3**	**406.2**	**929.3**	**677.6**	**961.8**	**2,324.2**	**2,579.4**	**4,419.9**	**2,953.3**	**1,782.1**	**1,490.8**	**1,093.2**	**1,663.8**	**1,332.5**	**804.0**	**237.1**
Chingri																			
Golda	366.8				522.2						110.8	241.0	170.2	150.5	126.0	102.0	160.3	57.0	
Icha	586.8	372.2	203.5	233.8	422.4		52.1	43.7	274.8	162.8	444.0	62.5	71.5	88.0	84.0	44.5	97.4		
Total chingri	**953.6**	**372.2**	**203.5**	**233.8**	**944.6**		**52.1**	**43.7**	**274.8**	**162.8**	**554.8**	**303.5**	**241.7**	**238.5**	**210.0**	**146.5**	**257.7**	**57.0**	
Summary Data																			
Finfish (A + B)	3,613.9	3,109.7	2,057.6	2,721.3	1,956.5	3,319.5	1,685.0	1,705.0	3,036.5	3,616.8	6,907.0	3,881.3	2,687.5	2,424.1	1,959.1	2,315.3	2,322.2	1,857.5	1,927.7
Chingri	953.6	372.2	203.5	233.8	944.6		52.1	43.7	274.8	162.8	554.8	303.5	241.7	238.5	210.0	146.5	257.7	57.0	0.0
Grand total	**4,767.6**	**3,481.9**	**2,261.1**	**3,155.0**	**2,901.1**	**3,319.5**	**1,737.1**	**1,748.7**	**3,311.3**	**3,779.6**	**7,461.8**	**4,184.8**	**2,929.2**	**2,662.6**	**2,169.1**	**2,461.8**	**2,579.9**	**1,914.5**	**1,927.7**

Table H.27: Species Composition in Gudimukh Duar (121)

Group/Species	Monthly catch (Kg)																		
	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																			
Rui		49.3	10.3										47.0						
Catla																			24.2
Kalibaush						42.9			122.4			138.7	15.8						
Mrigel					92.0								22.1						
a. Subtotal		**49.3**	**10.3**		**92.0**	**42.9**			**122.4**			**138.7**	**84.9**						**24.2**
Introduced Carp																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air	538.1	103.5	27.8				80.5				211.0	48.0	90.0				15.8		
Boal	717.5	123.2	30.9						130.6		192.7	110.0	350.0	90.4					
Bagair	358.7		18.6										60.0						
Chitol	179.4		15.5							8.0	55.1	72.6	73.0	70.0	51.8			3.1	
Foli														28.4					
Gozar													123.5						
Shole																			
Gonia																			
Lachu															71.8	11.0		53.4	
Ilish		14.8		25.3	170.8		149.4	83.7											
c. Subtotal	1,793.7	241.5	92.8	25.3	170.8		229.9	83.7	130.6	8.0	458.8	230.6	696.5	188.8	123.6	11.0	15.8	56.5	
A. Intertotal large finfish	1,793.7	290.7	103.1	25.3	262.8	42.9	229.9	83.7	253.0	8.0	458.8	369.3	781.4	188.8	123.6	11.0	15.8	56.5	24.2
Small catfish																			
Pabda		48.3				10.7								21.0					
Bacha									12.2										
Garua																			
Rita										29.2									
Tengra																			
Gulsha				14.1															
Batashi																			
Magur																			
Shing																			
Kazoli		19.7																	
d. Subtotal		68.0		14.1		10.7			12.2	29.2				21.0					
Other small species																			
Puti																			
Chapila		34.5																	
Chela																			
Mola																			
Dhela																			
Bata																			
Taki																			
Ketchki																			
Rani																			
Moa																			
Jainzza																			
Khorsula		30.4																	
Chanda													17.9						
Tara baim										15.9			65.0						
Baim																			
Gutum									61.2										
Bele																			
Guchi																			
e. Subtotal		64.9							61.2	15.9			82.9						
B. Intertotal small finfish		132.9				10.7			73.5	45.1			82.9	21.0					
Prawn									81.6										
Golda																			
Icha		69.1		16.9															
Total Prawn		69.1		16.9					81.6										
Summary Data																			
Finfish (A+B)	1,793.7	423.6	103.1	39.4	262.8	53.6	229.9	83.7	326.5	53.1	458.8	369.3	864.3	209.8	123.6	11.0	15.8	56.5	24.2
Prawn		69.1	0.0	16.9					81.6			0.0							
Grand total	1,793.7	492.7	103.1	56.3	262.8	53.6	229.9	83.7	408.1	53.1	458.8	369.3	864.3	209.8	123.6	11.0	15.8	56.5	24.2

Table H.28: Species Composition in Mathtapur Duar (122)

Group/Species	Monthly catch (Kg)																	
	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar,96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																		
Rui									6.0	164.0		13.3						
Catla																		
Kalibaush	98.9	14.7							18.1	492.1	84.9	18.9						
Mrigel												12.0		36.9				9.6
a. Subtotal	**98.9**	**14.7**							**24.1**	**656.2**	**84.9**	**44.2**		**36.9**				**9.6**
Introduced Carp																		
Common carp																		
Grass carp																		
Silver carp																		
b. Subtotal																		
Large catfish, Knifefish, Snakeheads and others																		
Air	120.8	16.8		232.7		42.8	33.4	25.6		787.4	38.4	30.5	90.0					
Boal	126.3	21.0	33.6					59.6		1,148.0	115.0	89.0	148.0	18.9				
Bagair		11.6								98.4	40.0	20.7						
Chitol		10.5								328.1		17.6					2.5	
Foli																		
Gozar																		
Shole																		
Gonia										262.5								
Lachu																		
Ilish				190.4		128.5	100.2										10.0	
c. Subtotal	**247.1**	**59.9**	**33.6**	**423.0**		**171.3**	**133.6**	**85.2**		**2,624.0**	**193.4**	**157.6**	**238.0**	**18.9**			**12.5**	
A. Intertotal large finfish	**346.0**	**74.6**	**33.6**	**423.0**		**171.3**	**133.6**	**85.2**	**24.1**	**3,281.0**	**278.3**	**202.0**	**238.0**	**55.8**			**12.5**	**9.6**
Small catfish																		
Pabda																		
Bacha	43.9	6.3											8.5					
Garua		6.3			11.6													
Rita																		
Tengra	43.9	3.2							9.1									
Gulsha																		
Batashi	16.5	2.1																
Magur																		
Shing																		
Kazoli		3.2																
d. Subtotal	**104.4**	**21.0**			**11.6**				**9.1**				**8.5**					
Other small species																		
Puti		4.2							12.1									
Chapila	33.0																	
Chela	22.0																	
Mola																		
Dhela																		
Bata																		
Taki																		
Ketchki																		
Rani																		
Moa																		
Jainzza																		
Khorsula																		
Chanda	11.0																	
Baim									11.1				70.0					
Gutum																		
Bele					6.3													
Guchi									4.0									
e. Subtotal	**65.9**	**4.2**			**6.3**				**27.1**				**70.0**					
B. Intertotal small finfish	**170.3**	**25.2**			**17.9**				**36.2**				**78.5**					
Prawn																		
Golda																		
Icha	33.0	5.3																
Total Prawn	**33.0**	**5.3**																
Summary Data																		
Finfish (A+B)	516.2	99.8	33.6	423.0	17.9	171.3	133.6	85.2	60.3	3,281.0	278.3	202.0	316.5	55.8			12.5	9.6
Prawn	33.0	5.3																
Grand total	**549.2**	**105.0**	**33.6**	**423.0**	**17.9**	**171.3**	**133.6**	**85.2**	**60.3**	**3,281.0**	**278.3**	**202.0**	**316.5**	**55.8**	**0.0**	**0.0**	**12.5**	**9.6**

Table H.29: Species Composition in Shahebnagar Duar (123)

Group/Species	Monthly catch (Kg)																		
	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																			
Rui	71.0						98.7				348.0	20.8	31.7	40.0					
Catla	22.3										822.3	147.9	50.0						
Kalibaush	405.3	167.3										58.0	83.0						
Mrigel																			
a. Subtotal	**498.6**	**167.3**					**98.7**				**1,170.3**	**226.7**	**164.7**	**40.0**					
Introduced Carp																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air	1,242.9								44.7		745.8	130.5	115.0	117.8	97.9				
Boal	669.9	234.2	304.8	70.0	70.5			168.8	57.4		906.3	260.0	371.0	130.0					
Bagair	446.0	143.8	203.2						25.5		407.7	45.0	43.0	60.7					
Chitol	260.0	123.9									346.7	31.0	62.0	81.5				12.4	
Foli											261.9								
Gozar																			
Shole											288.4								
Gonia																			
Lachu					57.7	83.8	111.0	180.4							39.8	8.5	6.6	28.7	10.2
Ilish																			
c. Subtotal	**2,618.8**	**501.9**	**508.0**	**70.0**	**128.1**	**83.8**	**111.0**	**349.2**	**127.6**		**2,956.8**	**466.5**	**591.0**	**390.0**	**137.6**	**8.5**	**6.6**	**41.1**	**10.2**
A. Intertotal large finfish	**3,117.4**	**669.2**	**508.0**	**70.0**	**128.1**	**83.8**	**209.7**	**349.2**	**127.6**		**4,127.1**	**693.2**	**755.7**	**430.0**	**137.6**	**8.5**	**6.6**	**41.1**	**10.2**
Small catfish																			
Pabda											348.0								
Bacha											198.9								
Garua																			
Rita										6.4									
Tengra										3.8									
Gulsha																			
Batashi																			
Magur																			
Shing																			
Kazoli																			
d. Subtotal										**10.2**	**546.9**								
Other small species																			
Puti																			
Chapila																			
Chela																			
Mola																			
Dhela																			
Bata																			
Taki																			
Kechki																			
Rani																			
Moa																			
Jainzza																			
Khorsula																			
Chanda										7.6	298.1								
Baim																			
Gutum										1.3									
Bele																			
Guchi										**8.9**	**298.1**								
e. Subtotal																			
B. Intertotal small finfish										**19.1**	**844.9**								
Prawn										6.4									
Golda							37.0												
Icha							**37.0**			**6.4**									
Total Prawn																			
Summary Data																			
Finfish (A+B)	3,117.4	669.2	508.0	70.0	128.1	83.8	209.7	349.2	127.6	19.1	4,972.0	693.2	755.7	430.0	137.6	8.5	6.6	41.1	10.2
Prawn	0.0						37.0			6.4									
Grand total	**3,117.4**	**669.2**	**508.0**	**70.0**	**128.1**	**83.8**	**246.7**	**349.2**	**127.6**	**25.5**	**4,972.0**	**693.2**	**755.7**	**430.0**	**137.6**	**8.5**	**6.6**	**41.1**	**10.2**

Table H.30: Species Composition in Kalni River (105)

GROUP/Species	Monthly catch (Kg)													
	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp														
Rui		28.2	30.9	21.8			149.9	235.7	159.0		80.0	175.0		
Catla			30.4					55.8				12.0		
Kalibaush	13.7	126.8		44.7		22.0			194.0			130.0		35.6
Mrigel														
a. Subtotal	**13.7**	**155.0**	**61.2**	**66.5**		**22.0**	**149.9**	**291.5**	**353.0**		**80.0**	**317.0**		**35.6**
Introduced Carp														
Common carp														
Grass carp														
Silver carp												27.0		
b. Subtotal												27.0		
Large catfish, Knifefish, Snakeheads and others														
Air		56.4			177.2							35.8		25.7
Boal	10.3	56.4	36.3	44.7	15.1	45.1			475.0		68.0	50.1		71.7
Bagair														
Chitol														
Foli	10.3	28.2	51.0	9.8							25.0			
Gozar														
Shole														
Gonia														
Lachu	6.5	56.4		37.6		22.8				23.0				
Ilish	14.8	126.8	41.2	13.6		7.3				37.8	32.8	18.3		
c. Subtotal	**41.8**	**324.1**	**128.4**	**105.7**	**192.3**	**75.2**			**475.0**	**60.8**	28.8	21.5		235.6
											154.6	**125.7**		**332.9**
A. Intertotal large finfish	**55.5**	**479.0**	**189.6**	**172.2**	**192.3**	**97.3**	**149.9**	**291.5**	**828.0**	**60.8**	**234.6**	**469.7**		**368.5**
Small catfish														
Pabda	12.1	28.2	22.5	18.5		17.6	20.3			40.0	29.0			14.5
Bacha		42.3	31.8	27.8										
Garua	10.4	56.4	58.8	40.9	178.4	47.7							43.5	87.4
Rita														110.6
Tengra	22.9	141.0	69.6	77.4		58.7	76.3	30.3	180.5	130.4	16.9	180.0	37.5	66.9
Gulsha	20.9	84.5	56.8	65.4	100.0	57.3		82.1		35.7	24.0		52.9	
Batashi	9.8	28.2	19.6	32.7		29.4			10.2	18.0	27.5	72.8		64.1
Magur														
Shing								36.6						
Kazoli		42.3	19.6	23.4		30.8					17.0			
d. Subtotal	**75.9**	**422.8**	**278.8**	**286.1**	**278.4**	**241.5**	**96.6**	**149.1**	**190.7**	**224.1**	**114.4**	**252.8**	**133.8**	**343.5**
Other small species														
Puti	39.2	70.5	39.2	138.4	37.8	44.0	83.3	277.4	226.4	70.5	40.0	244.4	36.1	52.2
Chapila	6.9	141.0	68.6	43.6	50.2	52.1		25.7			30.0	473.7	69.2	128.4
Chela	13.1	14.1	82.8	113.4		22.8	11.0	11.7	68.8	108.3	14.7	171.9	16.7	96.2
Mola														
Dhela			9.8	10.9		19.8			10.1		13.0			
Bata														
Taki	16.3				32.0	11.0	112.2	247.9	100.4	40.0		300.0		114.6
Ketchki	12.6					46.2								
Rani				8.7										
Moa				10.9										
Koi							19.0	43.9						
Khorsula		14.1												
Chanda	13.1	56.4	50.0		15.1	15.4			2.1	7.5	17.0	38.0		
Baim	11.1		55.9	115.0		51.4			221.7	48.0	30.0			
Gutum	6.5	28.2			10.0					26.0	18.5		38.9	
Bele	16.7	42.3	24.0	22.9	60.5	23.9				57.0	28.3			
Guchi	14.7	28.2	98.0				16.7			33.0	21.8	200.3		
Chaka				21.8										
Veda								12.1						
Kholisha											26.0			
Khakuri		14.1	11.8			8.8					23.7			
Baluchata										12.5				
Kakila	10.3			62.1		26.4								
e. Subtotal	**160.3**	**408.7**	**440.0**	**547.7**	**205.7**	**321.8**	**242.1**	**618.7**	**629.5**	**402.8**	**263.0**	**1,428.3**	**160.8**	**391.4**
B. Intertotal small finfish	**236.2**	**831.5**	**718.7**	**833.8**	**484.0**	**563.3**	**338.7**	**767.7**	**820.2**	**626.9**	**377.4**	**1,681.1**	**294.6**	**734.8**
Prawns														
Golda							72.2	15.0	49.3	71.0	29.0	123.5		
Icha	34.6	98.6	71.5	83.9	79.4	73.4		74.4	63.1	60.0	23.0	107.0	38.9	
Total Prawn	**34.6**	**98.6**	**71.5**	**83.9**	**79.4**	**73.4**	**72.2**	**89.4**	**112.4**	**131.0**	**52.0**	**230.5**	**38.9**	
Summary Data														
Finfish (A+B)	291.8	1,310.6	908.3	1,006.0	676.4	660.6	488.6	1,059.3	1,648.2	687.7	612.0	2,150.7	294.6	1,103.4
Prawn	34.6	98.6	71.5	83.9	79.4	73.4	72.2	89.4	112.4	131.0	52.0	230.5	38.9	0.0
Grand total	**326.4**	**1,409.2**	**979.8**	**1,090.0**	**755.7**	**734.0**	**560.8**	**1,148.6**	**1,760.7**	**818.7**	**664.0**	**2,381.2**	**333.5**	**1,104.0**

Table H.31: Species Composition in Sinai River (106)

Group/Species	Monthly catch (Kg)								
	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp									
Rui			76.0	87.5	63.0				
Catla				23.7					
Kalibaush		27.0	15.3	15.3	22.7				
Mrigel				10.1	4.5				
a. Subtotal		27.0	91.3	136.6	90.2				
Introduced Carp									
Common carp									
Grass carp									
Silver carp									
b. Subtotal									
Large catfish, Knifefish, Snakeheads and others									
Air			45.7	17.1					
Boal			40.0	23.5					
Bagair									
Chitol			17.7						
Foli									
Gozar		27.1							
Shole		100.8							
Gonia									
Lachu			9.6						
Ilish								28.1	15.8
c. Subtotal		127.9	113.0	40.6				28.1	15.8
A. Intertotal large finfish		154.9	204.3	177.2	90.2			28.1	15.8
Small catfish									
Pabda									
Bacha									
Garua		56.0						113.6	
Rita									
Tengra	33.6	30.1	61.4	200.7	177.6	21.8	69.5	25.1	
Gulsha		22.4		80.1			86.1	100.0	
Batashi		7.8	10.0			43.9	14.4		36.1
Magur		8.1							
Shing		12.1	102.0						
Kazoli									
d. Subtotal	33.6	136.5	173.5	280.8	177.6	65.7	169.9	238.7	36.1
Other small species									
Puti	89.9	217.0	196.6	200.4	221.5	65.9	69.1		96.6
Chapila		115.1				20.6	38.1	69.4	
Chela	55.4	23.6	46.0	12.5		27.0	62.0		52.4
Mola									
Dhela									
Bata									
Taki	39.1	326.2	344.8	272.9	328.1	75.1	117.1		53.7
Ketchki									
Rani									
Poa									
Jainzza									
Khorsula									
Chanda	1.0		9.5						
Baim									
Gutum							14.4		
Veda		18.8							63.6
Bele							51.1		
Guchi		61.6							
Koi	17.9	72.6							
e. Subtotal	203.2	834.8	596.9	485.7	549.6	188.6	351.7	69.4	266.3
B. Intertotal small finfish	236.9	971.3	770.4	766.5	727.2	254.3	521.6	308.1	302.3
Prawn									
Golda				105.3					
Icha	82.0	146.3	150.6	96.8	100.7	35.7	110.8		150.0
Total Prawn	82.0	146.3	150.6	202.0	100.7	35.7	110.8		150.0
Summary Data									
Finfish (A+B)	236.9	1,126.3	974.6	943.7	817.4	254.6	521.6	336.2	318.2
Prawn	82.0	146.3	150.6	202.0	100.7	35.7	110.8	0.0	150.0
Grand total	318.9	1,272.6	1,125.3	1,145.7	918.2	290.3	632.4	336.2	468.2

Table H.32: Species Comparison in Kalni River (130)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp													
Rui		11.6	25.8					12.8					18.5
Catla													
Kalibaush	48.9	15.5			32.3		25.0		17.8	20.5			12.7
Mrigel													
a. Subtotal	48.9	27.1	25.8		32.3		25.0	12.8	17.8	20.5			31.2
Introduced Carp													
Common carp													
Grass carp													
Silver carp													
b. Subtotal													
Large catfish, Knifefish, Snakeheads and others													
Air	30.6												
Boal	36.7	11.6			31.9				21.8	12.0			
Bagair													
Chitol													
Foli													
Gozar													
Shole													
Gonia													
Lachu	36.7	19.4		24.3	31.9				13.3				40.5
Ilish	55.0	11.6	10.3	25.9	22.8							99.7	70.1
c. Subtotal	158.9	42.6	10.3	50.1	86.5				35.1	12.0		99.7	110.6
A. Intertotal large finfish	207.8	69.7	36.2	50.1	118.9		25.0	12.8	52.9	32.5		99.7	141.8
Small catfish													
Pabda	24.4	7.7			18.2		8.7	7.1	23.0	6.7			
Bacha		12.6											
Garua				51.8								85.6	96.3
Rita	18.3	7.7	11.3		22.8				16.1	8.1			
Tengra	55.0	38.7	51.7	43.1	35.1		12.3	12.4	20.0	10.5		13.1	100.0
Gulsha	48.9	36.7	51.8	129.4	20.5		17.0		22.1	9.8		99.4	13.3
Batashi		7.7		10.3	23.7				16.5	5.3			
Magur													
Shing													
Kazoli		10.6			13.7				7.8				10.3
d. Subtotal	146.7	121.8	114.8	234.5	133.9		38.0	19.5	105.5	40.4		198.1	219.9
Other small species													
Puti	61.1	46.4		25.9	27.3	67.0	21.0	15.0	30.7	6.9		74.6	90.1
Chapila	18.3	27.1	77.5	34.5		40.2						28.9	168.3
Chela	12.2	7.7	51.6	25.9	9.1		8.9	11.2	10.0	7.4		58.7	61.2
Mola													
Dhela				8.9				9.8					
Bata													
Taki	24.4			86.3		73.5		9.6	10.3	8.4		69.3	83.6
Ketchki													
Rani													
Moa				8.3									
Jainzza													
Khorsula				15.3									
Chanda		34.8	15.5	60.4	4.7		8.6	4.7	10.3	4.1			
Baim	30.6	33.0	51.7	16.2	21.9		31.9	12.7	7.2	7.1			
Gutum	12.2						10.0	20.7					
Bele	30.6	19.4	62.0	34.5	54.6		13.5	7.0	10.4	7.9			
Kholisha	6.1			18.3									
Veda				8.6									
Khashkuri			9.3	19.3				10.1					
Kakila												106.7	
Guchi	18.3		20.7	86.3		30.1		8.7	6.5	6.8			
e. Subtotal	213.9	168.4	288.3	448.5	117.5	210.8	93.9	109.5	85.3	48.6		338.1	403.1
B. Intertotal small finfish	360.6	290.3	403.1	683.0	251.4	210.8	131.9	129.0	190.8	89.0		536.2	623.0
Prawn													
Golda						30.0							
Icha	42.8	27.1	77.5	129.4	85.2	27.8		12.0	12.4	3.0		53.3	152.9
Total Prawn	42.8	27.1	77.5	129.4	85.2	57.8		12.0	12.4	3.0		53.3	152.9
Summary Data													
Finfish (A+B)	568.3	359.9	439.3	733.1	370.2	210.8	156.9	141.8	243.7	121.5		635.9	764.9
Prawn	42.8	27.1	77.5	129.4	85.2	57.8	0.0	12.0	12.4	3.0		53.3	152.9
Grand total	611.1	387.0	516.8	862.5	455.4	268.6	156.9	153.8	256.1	124.5		689.2	917.8

Table H.33: Species Composition in Old Kushiyara River (131)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp													
Rui	47.3	88.3	33.7	1.8	29.4		72.8		48.7	19.8			267.7
Catla													
Kalibaush	142.0	71.2	35.6	3.5	56.9	67.0	81.0	15.4	21.3	41.5			
Mrigel													
a. Subtotal	189.3	159.5	69.3	5.3	86.4	67.0	153.8	15.4	70.0	61.3			267.7
Introduced Carp													
Common carp	47.3												
Grass carp													
Silver carp													
b. Subtotal	**47.3**												
Large catfish, Knifefish, Snakeheads and others													
Air	118.3			3.5									
Boal	307.6	59.8	50.2	8.8	181.6	103.5	87.8	8.3	18.7	27.4			
Bagair													
Chitol				2.0			31.8		18.3	31.8			
Foli													
Gozar													
Shole													
Gonia													
Lachu	189.3		15.1	12.3		85.0		42.7	27.0	27.1			
Ilish	47.3	39.9	21.5	3.5	19.6	30.1							
c. Subtotal	**662.6**	**99.7**	**86.8**	**30.1**	**201.2**	**218.6**	**119.6**	**51.0**	**64.0**	**86.3**			
A. Intertotal large finfish	899.2	259.2	156.1	35.4	287.6	285.6	273.4	66.4	134.0	147.6			267.7
Small catfish													
Pabda	45.3	79.8	14.4	3.6	169.8	47.8	42.5	40.0	32.0	28.9			
Bacha	98.7		31.2			35.0		12.1				265.1	
Garua	69.0		35.9	7.0									
Rita	49.3												
Tengra	284.0	99.7	61.0	19.6	198.3	70.1	67.0	19.0	24.0	27.0			
Gulsha	213.0	46.1	63.9	14.1			71.5	22.5	31.6	23.5			
Batashi		26.6	21.5	5.3	26.5	11.9		9.3	11.8	10.3			28.7
Magur													
Shing													
Kazoli													
d. Subtotal	**759.2**	**252.2**	**227.8**	**49.6**	**394.5**	**164.8**	**181.0**	**102.9**	**99.4**	**89.7**		**265.1**	**28.7**
Other small species													
Puti	236.6	80.7	88.3	14.1	90.3	73.0	62.0	13.7	19.0	27.3			164.2
Chapila	26.7	68.4	43.1	17.6		82.0	77.0		43.0	14.8		307.3	98.3
Chela	46.3	30.9	22.2	6.1	55.0	35.0	27.6	19.4	63.3	17.5			46.0
Mola									17.8	16.3			
Dhela	20.7	13.3		1.9	12.8	13.1	17.0		14.0	12.0			
Bata									31.5	29.5			
Taki				7.1				14.5	23.6	27.4			
Ketchki													
Rani			10.8	1.8									
Moa			21.5	2.4				12.4					
Koi	11.8												
Khorsula													
Chanda	23.7	54.1	1.0	7.1		34.7	19.0	11.0	13.4	12.5			
Baim	90.7	67.4	37.0	4.5	60.9	81.0	78.0	12.6	34.0	20.2			
Gutum							28.3	8.5					
Bele	94.7	35.1	31.6	2.5	33.4	83.7	72.6	18.7	28.3	12.8			
Chaka	23.7		10.3										
Kashkauri	11.8		18.4	1.7			15.3		16.5				
Piali				0.9									
Veda						59.0		9.7					
Kakila			29.4						21.0	18.3			
Guchi	73.0	88.3		15.7	47.1	67.0	17.5	6.0	21.7	20.3			
e. Subtotal	**659.5**	**438.1**	**313.4**	**83.2**	**299.3**	**528.5**	**414.3**	**126.5**	**347.1**	**228.8**		**307.3**	**308.4**
B. Intertotal small finfish	1,418.8	690.3	541.3	132.8	693.9	693.3	595.3	229.4	446.5	318.5		572.4	337.2
Prawn						135.0	117.0	12.5	22.7	44.0			250.2
Golda						92.0	12.8	9.3	13.8	13.2			115.8
Icha	48.3		20.1	8.1		227.0	129.8	21.8	36.5	57.2			366.0
Total Prawn	48.3		20.1	8.1									
Summary Data													
Finfish (A+B)	2,317.9	949.5	697.4	168.2	981.4	978.9	868.7	295.8	580.5	466.1		572.4	604.8
Prawn	48.3	0.0	20.1	8.1	0.0	227.0	129.8	21.8	36.5	57.2		0.0	366.0
Grand total	**2,366.3**	**949.5**	**717.5**	**176.3**	**981.4**	**1,205.9**	**998.5**	**317.6**	**617.0**	**523.3**		**572.4**	**970.8**

Table H.34: Species Composition in Kumarpara Floodplain (114)

Group/Species	Monthly catch (Kg)													
	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp														
Rui				10.1										
Catla														
Kalibaush				12.1										
Mrigel														
a. Subtotal				22.2										
Introduced Carp														
Common carp														
Grass carp														
Silver carp														
b. Subtotal														
Large catfish, Knifefish, Snakeheads and others														
Air														
Boal	31.1													
Bagair														
Chitol														
Foli														
Gozar														
Shole														
Gonia														
Lachu														
Ilish		296.7	194.0											421.3
c. Subtotal	**31.1**	**296.7**	**194.0**											**421.3**
A. Intertotal large finfish	31.1	296.7	194.0	22.2										421.3
Small catfish														
Pabda	43.6													
Bacha														
Garua														
Rita	80.9	99.2												
Tengra				55.4										
Gulsha														
Batashi														
Magur														
Shing														
Kazoli														
d. Subtotal	**124.4**	99.2		55.4										
Other small species														
Puti				83.2	107.5								8.4	
Chapila														
Chela													5.5	
Mola													3.0	
Dhela														
Bata														
Taki	31.1			55.5	140.7								8.5	
Ketchki														
Rani														
Moa														
Jainzza														
Khorsula														
Chanda				27.8	19.8								5.5	
Baim				27.7										
Tara Baim				33.3										
Gutum														
Bele	93.3													
Guchi				83.2									15.0	
e. Subtotal	**124.4**			**310.6**	**267.9**								**45.9**	
B. Intertotal small finfish	248.8	99.2		366.0	267.9								45.9	
Prawn														
Golda	342.2	430.6	210.1	166.3									28.5	468.1
Icha					60.4									
Total Prawn	342.2	430.6	210.1	166.3	60.4								28.5	468.1
Summary Data														
Finfish (A+B)	279.9	395.9	194.0	388.2	267.9								45.9	421.3
Prawn	342.2	430.6	210.1	166.3	60.4								28.5	468.1
Grand total	622.2	826.5	404.1	554.5	328.2	Dry	Dry	Dry	Dry	Dry	Dry	Dry	74.4	889.4

Table H. 35 Species Composition at Gazaria (PU 1)

Group/Species	Monthly catch (Kg)								
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96
Major carp									
Rui		1.1		0.8					
Catla									
Kalibaush	2.5					Dry & Platform Construction			
Mrigel									
a. Subtotal	2.5	1.1		0.8					
Introduced Carp									
Common carp									
Grass carp									
Silver carp									
b. Subtotal									
Large catfish, Knifefish, Snakeheads and others									
Air	14.9								
Boal					3.3				
Bagair									
Chitol									
Foli			1.1	0.8					
Gozar									
Shole									
Gonia									
Lachu	19.8			11.8	8.2				
Ilish	7.4	1.1	2.3	5.0					
c. Subtotal	42.2	1.1	3.4	17.6	11.5				
A. Intertotal large finfish	44.6	2.2	3.4	18.5	11.5				
Small catfish									
Pabda	9.9			8.4					
Bacha					9.8				
Garua	14.9			6.7					
Rita			1.1						
Tengra	44.6	6.5		21.8					
Gulsha	32.2		11.4	16.8					
Batashi				5.0					
Magur									
Shing									
Kazoli			2.3						
d. Subtotal	101.7	6.5	14.8	58.7	9.8				
Other small species									
Puti	37.2	8.2	17.1	16.8					
Chapila	2.5	2.7	17.1	10.1	11.5				
Chela	5.0	6.5		5.0					
Mola									
Dhela	2.5								
Bata									
Taki		6.5		6.7					
Ketchki									
Rani									
Moa				1.7					
Jainzza									
Khorsula				3.4					
Chanda	5.0	5.4		5.0					
Baim	5.0	2.7	8.0	6.7					
Gutum									
Bele	12.4		11.4	8.4					
Balichata	2.5			1.7					
Koi	1.2								
Kaskuri	1.2			1.7					
Guchi	5.0	5.4	17.1	6.7					
e. Subtotal	79.3	37.6	70.5	73.8	11.5				
B. Intertotal small finfish	181.0	44.1	85.3	132.5	21.3				
Prawn									
Golda									
Icha	22.3	8.2	25.0	16.8					
Total Prawn	22.3	8.2	25.0	16.8					
Summary Data									
Finfish (A+B)	225.6	46.3	88.7	132.5	32.8				
Prawn	22.3	8.2	25.0	16.8	0.0				
Grand total	248.0	54.4	113.7	167.7	32.8	Dry	Dry	Dyke work	

Table H.36 Species Composition at Shahnagar (PU 2)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp													
Rui	5.4		2.4										
Catla													
Kalibaush			3.6										
Mrigel													
a. Subtotal	5.4		6.1										
Introduced Carp													
Common carp													
Grass carp													
Silver carp													
b. Subtotal													
Large catfish, Knifefish, Snakeheads and others													
Air	5.4												
Boal													
Bagair													
Chitol													
Foli													
Gozar													
Shole													
Gonia													
Lachu	24.1	7.3	8.5									4.0	
Ilish	21.4	6.1	2.4										
c. Subtotal	50.9	13.4	10.9										
A. Intertotal large finfish	56.3	13.4	17.0									4.0	
Small catfish													
Pabda	13.4												
Bacha													
Garua													
Rita			3.6										
Tengra	48.3		6.1									3.0	4.0
Gulsha	40.2		14.6									4.5	6.5
Batashi													
Magur													
Shing													
Kazoli			6.1										
d. Subtotal	101.9		30.4									7.5	10.5
Other small species													
Puti	42.9	13.4	18.2									6.5	6.0
Chapila		15.2	17.0										
Chela	13.4	7.3										2.3	4.5
Mola													
Dhela													
Bata													
Taki												2.8	7.0
Ketchki													
Rani													
Moa													
Jainzza													
Khorsula													
Chanda	8.0	6.1											2.0
Baim	10.7		6.3										
Gutum													
Bele	8.0		12.2										
Kaskuri	2.7												
Guchi	8.0		8.5									2.0	3.0
e. Subtotal	93.8	42.0	62.1									13.6	22.5
B. Intertotal small finfish	195.7	42.0	92.5									21.1	33.0
Prawn													
Golda		5.5											
Icha	16.1		12.2									3.5	6.3
Total Prawn	16.1	5.5	12.2									3.5	6.3
Summary Data													
Finfish (A+B)	251.9	55.4	109.5									25.1	33.0
Prawn	16.1	5.5	12.2									3.5	6.3
Grand total	268.0	60.9	121.5	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	28.6	39.3

Table H.37 Species Composition at Kakailseo (PU 4)

Group/Species	Monthly catch (Kg)						
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96
Major carp							
Rui		5.0	0.9	4.1			
Catla					Dike and Platform Work		
Kalibaush	9.3		4.5	6.2			
Mrigel							
a. Subtotal	9.3	5.0	5.4	10.3			
Introduced Carp							
Common carp							
Grass carp							
Silver carp							
b. Subtotal							
Large catfish, Knifefish, Snakeheads and others							
Air							
Boal							
Bagair							
Chitol							
Foli				3.1			
Gozar							
Shole							
Gonia							
Lachu	30.8	11.8	7.3	14.4			
Ilish	12.3	8.4	1.8	4.1			
c. Subtotal	43.2	20.2		21.6			
A. Intertotal large finfish	52.4	25.2	14.5	31.9			
Small catfish							
Pabda	15.4						
Bacha				4.1			
Garua	18.5			10.4			
Rita							
Tengra	55.5	25.2	10.9	26.8			
Gulsha	43.2		10.9	9.3			
Batashi	6.2	5.0		10.3			
Magur							
Shing							
Kazoli			1.8				
d. Subtotal	138.8	30.2	23.6	60.8			
Other small species							
Puti	46.3	20.2	9.1	16.5			
Chapila		16.8	6.4	12.4			
Chela	9.3	8.4	7.3	6.2			
Mola							
Dhela	6.2	8.4					
Bata							
Taki							
Ketchki							
Rani							
Moa				2.1			
Jainzza							
Khorsula	3.1	3.4		4.1			
Chanda	6.2	5.0		14.4			
Baim	15.4	8.4	3.6	6.2			
Gutum							
Bele	12.3	8.4	10.9	22.6			
Guchi	6.2	16.8	9.1	20.6			
e. Subtotal	104.8	95.8	46.3	105.0			
B. Intertotal small finfish	243.6	126.0	69.8	165.8			
Prawn							
Golda							
Icha	12.3	16.8	6.4	8.2			
Total Prawn	12.3	16.8	6.4	8.2			
Summary Data							
Finfish (A+B)	296.0	151.2	84.3	197.7			
Prawn	12.3	16.8	6.4	8.2			
Grand total	308.5	168.0	90.8	205.9	Dyke & Platform Work		

Table H.38 Species Composition at Katkhal (PU 5)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major Carp													
Rui			3.6		4.5	2.1							
Catla													
Kalibaush	53.3		3.6										
Mrigel													
a. Subtotal	53.3		7.2		4.5	2.1							
Introduced Carp													
Common carp													
Grass carp													
Silver carp													
b. Subtotal													
Large catfish, Knifefish, Snakeheads and others													
Air	29.6		3.6										
Boal	47.4		5.4										
Bagair													
Chitol													
Foli		3.2			1.1	0.5							
Gozar													
Shole			3.6										
Gonia													
Lachu	47.4	12.8	9.0		28.0	8.0				9.0		30.5	19.8
Ilish	5.9	3.2	3.6							5.7			45.7
c. Subtotal	130.2	19.2	25.1		29.2	8.5				14.7		30.5	65.5
A. Intertotal large finfish	183.5	19.2	32.3		33.7	10.7				14.7		30.5	65.5
Small catfish													
Pabda	29.6											6.4	11.0
Bacha													
Garua	29.6												
Rita													
Tengra	59.3	12.8	26.9									47.0	
Gulsha	53.3		17.9			22.4						27.9	
Batashi	11.8	8.0											
Magur													
Shing													
Kazoli													
d. Subtotal	183.6	20.8	44.9			22.4						81.3	11.0
Other small species													
Puti	71.1	16.0	21.5	20.9									
Chapila		9.6	17.9		78.5	19.2				31.5			37.0
Chela	17.8	8.0	9.0										
Mola													
Dhela	5.9	3.2	3.6										
Bata													
Taki		9.6		50.0									
Ketchki													
Rani													
Moa													
Jainzza													
Khorsula													
Chanda	5.9	19.2	9.0										
Baim	35.5	12.8	5.4	15.8									
Kaskuri	5.9	3.2											
Gutum													
Bele	15.6	8.0	17.9	13.0									
Fasha						1.1							
Guchi	11.8	6.4											
e. Subtotal	169.6	96.1	84.3	99.7	78.5	20.3				31.5			37.0
B. Intertotal small finfish	353.2	117.0	129.2	99.7	78.7	42.7				31.5		81.3	48.0
Prawn													
Golda													
Icha	56.0	24.0	17.9	19.5									
Total Prawn	56.0	24.0	17.9	19.5									
Summary Data													
Finfish (A+B)	536.7	136.2	161.4	99.7	112.2	53.4				46.2		111.8	113.5
Prawn	56.0	24.0	17.9	19.7									
Grand total	592.7	160.2	179.4	119.4	112.2	53.4	0.0	0.0	0.0	46.2		111.8	113.5

Table H.39 Species Composition in Bheramohona Beel (132)

Group/Species	Monthly catch (Kg)												
	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp													
Rui	51.5	116.6		10.0	22.9	67.8	630.0	458.0				12.7	
Catla			113.0										
Kalibaush	75.7	273.5		10.0	38.2	81.1	213.7	321.0					
Mrigel							69.0	61.0					
a. Subtotal	127.2	390.1	113.0	20.0	61.1	148.9	912.7	840.0				12.7	
Introduced Carp													
Common carp	6.3				27.3	19.5	27.8	100.4					
Grass carp													
Silver carp													
b. Subtotal	6.3				27.3	19.5	27.8	100.4					
Large catfish, Knifefish, Snakeheads and others													
Air	164.1			10.0	22.7	38.4		207.0					
Boal	214.6	26.5	113.1	35.0	89.0	61.4	102.0	200.5					
Bagair													
Chitol					23.6	30.0	32.8	22.8					
Foli			22.6	10.0									
Gozar													
Shole													
Gonia													
Lachu	88.4			35.0		52.0	172.5	110.6					
Ilish	87.3	106.9	22.6										
c. Subtotal	554.4	133.4	158.3	89.9	135.4	181.8	307.3	540.9					
A. Intertotal large finfish	687.9	523.4	271.3	109.9	223.7	350.1	1,247.8	1,481.3				12.7	
Small catfish													
Pabda	75.7		169.6	15.0	43.6	22.0	61.5						
Bacha	37.9			20.0									
Garua	49.5			25.0								26.8	
Rita			22.6	15.0									
Tengra				25.0	47.3	60.5	73.8	88.0	87.5	160.8	67.8		
Gulsha	176.7		226.0	20.0	154.5	42.3	28.3	188.0		79.0		84.0	79.3
Batashi				10.0				71.8	71.5		12.4	13.9	
Magur													
Shing													
Kazoli				4.6	55.2	5.5	17.0						
d. Subtotal	339.8		418.2	134.4	300.6	130.3	180.6	347.8	159.0	239.8	80.1	124.7	79.3
Other small species													
Puti				40.0	70.9		143.5	234.5	166.3	147.8	107.9	17.2	50.3
Chapila		318.1	226.1	50.0	204.4	40.0	152.3	190.0		165.7	58.4	23.3	54.2
Chela				25.0		18.5					53.4	8.8	24.2
Mola													
Dhela				2.5			13.5						
Bata													
Taki							160.5	86.9	209.0	29.9	128.5		
Ketchki													
Rani													
Moa				7.5									
Koi													
Khorsula				5.0									
Chanda				10.0							1.9		
Baim	89.4			15.0				305.0	161.0				
Gutum													
Bele	75.7		135.7	15.0									
Chaka	6.3			5.0									
Kashkauri				10.0			30.4						
Piali													
Veda													81.3
Kakila													
Guchi				10.0				100.3			24.4		
e. Subtotal	171.5	318.1	361.8	194.8	275.3	58.5	500.2	916.7	536.3	343.5	374.5	49.3	209.9
B. Intertotal small finfish	511.3	318.1	780.0	329.2	575.9	188.8	680.8	1,264.5	695.3	583.2	454.6	174.0	289.2
Prawn													
Golda						28.3	71.0	197.0	106.7	80.5	77.8	129.1	300.0
Icha	63.1		79.1	59.9	109.0	9.4	24.4	83.0	66.0				142.8
Total Prawn	63.1		79.1	59.9	109.0	37.7	95.4	280.0	172.7	80.5	77.8	129.1	442.8
Summary Data													
Finfish (A+B)	1,199.2	841.5	1,051.3	439.1	799.6	538.9	1,928.6	2,745.8	695.3	583.2	454.6	186.7	289.2
Prawn	63.1	0.0	79.1	59.9	109.0	37.7	95.4	280.0	172.7	80.5	77.8	129.1	442.8
Grand total	1,262.3	841.5	1,130.4	499.0	908.6	576.6	2,024.0	3,025.8	868.0	663.8	532.4	315.7	731.9

Table H.40 Species Composition in Biddyakhola Beel (113)

Group/Species	Monthly catch (Kg)																		
	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																			
Rui			30.0				52.0		23.6		212.5		85.7	3.0					
Catla											200.1								
Kalibaush	44.4	39.1					41.6	23.3	27.2		70.2								
Mrigel																			
a. Subtotal	**44.4**	**39.1**	**30.0**				**93.6**	**23.3**	**50.8**		**482.7**		**85.7**	**3.0**					
Introduced Carp																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air																			
Boal	43.4	29.4	40.7					10.8					72.6	26.3					
Bagair																			
Chitol																			
Foli																			
Gozar	15.8	16.3	13.3																
Shole	19.8	13.0	20.0															12.0	
Gonia																			
Lachu										44.0									
Ilish																			
c. Subtotal	**78.9**	**58.7**	**74.0**					**10.8**		**44.0**			**72.6**	**26.3**				**12.0**	
A. Intertotal large finfish	123.3	97.8	104.0				93.6	34.0	50.8	44.0	482.7		158.3	29.3				12.0	
Small catfish																			
Pabda						12.8													
Bacha																			
Garua																			
Rita							57.2												
Tengra		26.1	45.7	11.5		59.0		43.0	54.1	100.5	74.9	2.3	137.6	12.0	105.3	13.7	30.0	22.7	43.5
Gulsha			47.7			46.2				20.2					30.0				37.8
Batashi													48.5	37.8			7.8		
Magur																			
Shing																			
Kazoli																			
d. Subtotal		**26.1**	**93.3**	**11.5**		**118.0**	**57.2**	**43.0**	**54.1**	**120.7**	**74.9**	**2.3**	**186.1**	**49.8**	**135.3**	**13.7**	**37.8**	**22.7**	**81.3**
Other small species																			
Puti		32.6	50.0	8.3	17.2	25.7	67.6	19.7	62.2	138.5	119.6	1.6	64.1	85.0	161.7	22.1	60.0	16.5	62.0
Chapila											107.2	4.5	52.3	13.0	71.6	8.3	8.9	14.4	76.4
Chela													20.7	1.3	17.8	1.0	27.0		21.0
Mola																			
Dhela								5.4											
Bata																			
Taki		29.4	30.7			64.5			56.1	122.8	143.5	3.7	74.8	101.4	101.3	10.7	45.6	30.7	75.9
Ketchki																			
Rani																			
Koi												2.0							
Kholisha					7.0					6.9									
Khorsula																			
Chanda		22.8		2.3	10.3	7.7	31.2		4.1										13.9
Baim		35.9	32.7						43.3	100.5									
Guturn		26.1		6.0	6.8														
Bele						10.3													
Guchi		22.8		4.1					46.9	45.3			9.9				71.7		
e. Subtotal		**169.6**	**113.3**	**20.7**	**41.2**	**108.1**	**98.8**	**25.1**	**212.6**	**414.1**	**370.3**	**11.8**	**221.7**	**200.6**	**352.3**	**42.0**	**213.2**	**61.6**	**249.1**
B. Intertotal small finfish		195.7	206.6	32.1	41.2	226.1	156.1	68.1	266.7	534.7	445.2	14.0	407.8	250.4	487.6	55.7	251.0	84.3	330.3
Prawn																			
Golda	21.3						270.5	77.0		63.2				20.4	40.0				210.0
Icha	33.0	32.6	22.7	13.8	27.5	30.8			43.3	52.2	81.6	1.3	36.7	50.0	12.6	7.2	35.1	21.5	60.0
Total Prawn	54.3	32.6	22.7	13.8	27.5	30.8	270.5	77.0	43.3	115.3	81.6	1.3	36.7	70.4	52.6	7.2	35.1	21.5	270.0
Summary Data																			
Finfish (A + B)	123.3	293.5	310.6	32.1	41.2	226.1	249.7	102.1	317.5	578.7	927.9	14.0	566.0	279.7	487.6	55.7	251.0	96.3	330.3
Prawn	54.3	32.6	22.7	13.8	27.5	30.8	270.5	77.0	43.3	115.3	81.6	1.3	36.7	70.4	52.6	7.2	35.1	21.5	270.0
Grand total	**177.6**	**326.2**	**333.3**	**45.9**	**68.7**	**256.9**	**520.1**	**179.1**	**360.8**	**694.0**	**1,009.5**	**15.3**	**602.7**	**350.0**	**540.2**	**62.9**	**286.1**	**117.8**	**600.3**

Table H.41 Species Composition in Dhuiya Beel (112)

Group/Species	Monthly catch (Kg)																		
	Feb-95	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																			
Rui	258.6										273.1	140.0		112.0					
Catla																			
Kalibaush	478.6	113.7	134.1						4.9			190.0	130.0	200.5					
Mrigel				19.2															
a. Subtotal	**737.2**	**113.7**	**134.7**	**19.2**					**4.9**		**273.1**	**330.0**	**130.0**	**312.5**					
Introduced Carp																			
Common carp																			
Grass carp																			
Silver carp																			
b. Subtotal																			
Large catfish, Knifefish, Snakeheads and others																			
Air	379.1	151.6	100.5																
Boal	324.3	150.6	120.7								554.0	70.8	48.0	320.5					
Bagair																			
Chitol																			
Foli	37.9																		
Gozar	113.7	75.8	46.9																
Shole	151.6	113.7	53.6									48.0							
Gonia	151.6																		
Lachu																			
Ilish				13.7															
c. Subtotal	**1,158.2**	**491.7**	**321.7**	**13.7**							**554.0**	**118.8**	**48.0**	**320.5**					
A. Intertotal large finfish	**1,895.4**	**605.4**	**456.4**	**32.8**					**4.9**		**827.1**	**448.8**	**178.0**	**633.0**					
Small catfish																			
Pabda				10.4		98.0													
Bacha							129.2												
Garua							139.0												22.1
Rita							148.7	38.3			42.0								
Tengra	303.2		114.0						24.5		75.2	194.0	110.0	230.0	152.0	30.6	47.4		
Gulsha	454.9								23.5			236.0	61.7	170.0	67.0		22.3		
Batashi	113.7		53.6				60.7						60.0	115.0					6.3
Magur																			
Shing																			
Kazoli							41.3												
d. Subtotal	**871.8**		**167.6**	**10.4**		**98.0**	**518.9**	**38.3**	**48.0**		**117.2**	**430.0**	**231.7**	**515.0**	**219.0**	**30.6**	**69.7**		**28.3**
Other small species																			
Puti	306.1	75.8		11.5			258.5		50.0	6.6	143.9	420.0	178.3	450.0	135.0	35.8	36.6	19.9	60.0
Chapila	113.7								3.3		113.3	355.0	37.1	230.0	84.0		23.7	37.3	144.3
Chela	151.6										65.6	120.9	40.0	117.0	48.0	4.6		25.3	29.0
Mola																			
Dhela							14.6												
Bata																			
Taki										6.1	146.2	260.0	190.5	270.0	90.0	15.0	45.0	68.7	45.6
Ketchki												60.8							
Rani																			
Moa																			
Veda											44.7						5.4		
Khorsula																			
Chanda							34.1			0.4									
Baim	151.6		46.9																
Guturn																	3.3		
Bele																			
Guchi																			
Kholisha																			2.0
Kakila																	5.5		
e. Subtotal	**723.1**	**75.8**	**46.9**	**11.5**			**307.2**		**53.3**	**13.1**	**513.6**	**1,216.7**	**445.9**	**1,067.0**	**357.0**	**55.3**	**119.4**	**151.2**	**280.9**
B. Intertotal small finfish	**1,594.9**	**75.8**	**214.5**	**21.9**		**98.0**	**826.1**	**38.3**	**101.3**	**13.1**	**630.9**	**1,646.7**	**677.6**	**1,582.0**	**576.0**	**85.9**	**189.1**	**151.2**	**309.2**
Prawn																			
Golda	45.2				213.8	228.6		115.0		90.7		250.0	107.0	340.0	74.6	20.8	32.5	40.6	313.8
Icha	255.1	76.8					148.7		57.2			70.0	41.0	70.0	25.8				120.5
Total Prawn	**300.3**	**76.8**			**213.8**	**228.6**	**148.7**	**115.0**	**57.2**	**90.7**		**320.0**	**148.0**	**410.0**	**100.4**	**20.8**	**32.5**	**40.6**	**434.3**
Summary Data																			
Finfish (A+B)	3,490.3	681.2	671.0	54.7		98.0	826.1	38.3	106.2	13.1	1,457.9	2,095.5	855.6	2,215.0	576.0	85.9	189.1	151.2	309.2
Prawn	300.3	76.8			213.8	228.6	148.7	115.0	57.2	90.7	0.0	320.0	148.0	410.0	100.4	20.8	32.5	40.6	434.3
Grand total	**3,790.6**	**758.0**	**671.0**	**54.7**	**213.8**	**326.6**	**974.8**	**153.4**	**163.4**	**103.8**	**1,457.9**	**2,415.5**	**1,003.6**	**2,625.0**	**676.4**	**106.7**	**221.6**	**191.8**	**743.4**

Table H.42 Species Composition in Borogop Beel (111)

Group/Species	Monthly catch (Kg)																	
	Mar-95	Apr-95	May-95	Jun-95	Jul-95	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Apr-96	May-96	Jun-96	Jul-96	Aug-96
Major carp																		
Rui		36.2								560.0	340.0	630.5	11.0					
Catla												270.0				47.8		
Kalibaush		86.8								530.3								
Mrigel																		
a. Subtotal		**122.9**								**1,090.3**	**340.0**	**900.5**	**11.0**			**47.8**		
Introduced Carp																		
Common carp																		
Grass carp																		
Silver carp																		
b. Subtotal																		
Large catfish, Knifefish, Snakeheads and others																		
Air	153.1	100.5								491.0	210.0							
Boal	165.1	116.5								1,500.2	70.0	340.8	30.0					
Bagair																		
Chitol																		
Foli																		
Gozar		43.4									130.5	360.4						
Shole		50.6									70.0	430.0						
Gonia		43.4																
Lachu										905.6								
Ilish																		
c. Subtotal	**318.3**	**354.4**								**2,896.9**	**480.5**	**1,131.2**	**30.0**					
A. Intertotal large finfish	**318.3**	**477.3**								**3,987.2**	**820.5**	**2,031.7**	**41.0**			**47.8**		
Small catfish																		
Pabda		43.4			78.9													
Bacha	57.4					181.1	34.3	12.8										
Garua	95.7		61.9			211.3	18.5										30.5	
Rita			32.5															
Tengra	210.6	122.9	38.7				44.9	16.0	52.4	296.9	350.7	209.9	9.8	201.8	48.0			
Gulsha			21.7			120.8				225.3		200.1					17.0	
Batashi												200.0	7.0		21.0	17.0		58.0
Magur																		
Shing																		
Kazoli																		
d. Subtotal	**363.7**	**166.3**	**154.8**		**78.9**	**513.2**	**97.7**	**28.8**	**52.4**	**522.3**	**350.7**	**610.0**	**16.8**	**201.8**	**69.0**	**17.0**	**47.5**	**58.0**
Other small species																		
Puti	191.4					90.6	26.4	35.2	41.9	844.5	79.9	370.0	10.8	170.0	10.0	60.7		142.0
Chapila	95.7									422.5	120.0	386.0	9.5			30.0	63.8	114.8
Chela	76.6								10.5	52.2	48.7		8.0	62.0	10.0			82.5
Mola																		
Dhela	57.4																	
Bata																		
Taki	95.7							41.6	38.4	277.6	75.0	437.0	8.5	92.8	9.0	70.0		
Ketchki																		
Rani																		
Moa	38.3																	
Veda												300.0						72.0
Kaskauri	38.3																	
Khorsula								9.6	7.0									
Chanda	95.7								17.5	91.4	40.0							
Baim	114.9																	
Gutum	66.6																	
Bele	74.9				131.6				52.4									
Guchi	134.0												5.0			9.2		
Koi								6.4	7.0		36.0							
e. Subtotal	**1,079.5**				**131.6**	**90.6**	**26.4**	**92.8**	**174.7**	**1,688.2**	**399.6**	**1,493.0**	**41.8**	**324.8**	**29.0**	**169.9**	**63.8**	**411.3**
B. Intertotal small finfish	**1,443.2**	**166.3**	**154.8**		**210.5**	**603.8**	**124.1**	**121.6**	**227.1**	**2,210.4**	**750.2**	**2,103.0**	**58.6**	**526.6**	**98.0**	**186.9**	**111.3**	**469.3**
Prawn																		
Golda				535.6	315.6		139.9	198.4	69.9	197.0	120.0	230.0	6.0	70.0	20.0	40.0		312.5
Icha	153.1	79.5							52.4	133.5	90.0	260.0		27.5	7.8			70.0
Total Prawn	**153.1**	**79.5**		**535.6**	**315.6**		**139.9**	**198.4**	**122.3**	**330.5**	**210.0**	**490.0**	**6.0**	**97.5**	**27.8**	**40.0**		**382.5**
Summary Data																		
Finfish (A + B)	1,761.5	643.6	154.8		210.5	603.8	124.1	121.6	227.1	6,197.6	1,570.7	4,134.7	99.6	526.6	98.0	234.7	111.3	469.3
Prawn	153.1	79.5		535.6	315.6	0.0	139.9	198.4	122.3	330.5	210.0	490.0	6.0	97.5	27.8	40.0		382.5
Grand total	**1,914.6**	**723.1**	**154.8**	**535.6**	**526.4**	**603.8**	**264.0**	**320.0**	**349.4**	**6,528.1**	**1,780.7**	**4,624.7**	**105.6**	**624.1**	**125.8**	**274.7**	**111.3**	**851.8**

Table H.43: Estimation of Total Fish Production in Project Area Based on NERP Sampling (Nominal period: August 1995 to July 1996)

Habitat	Area (ha)	Standing crop (kg/ha/yr)	Production (tonnes)	% total
RIVERINE HABITATS				
Kalni-Kushiyara River *	3,955	202	798	
Other flowing rivers **	3,104	273	848	
Closed and dead rivers	3,721	122	453	
Distributaries	1,250	122	152	
Subtotal	**12,030**	**187**	**2,251**	**4.1**
FLOODPLAIN HABITATS				
Floodplain (net of other habitats)	260,200	160	41,554	
Beels	13,340	503	6,711	
Ponds ***	2,466	1,637	4,036	
Subtotal	**276,006**	**189**	**52,301**	**95.9**
TOTAL	**288,036**	**189**	**54,552**	**100.0**

Note: * *Duars* account for 318.2 tonnes (or 40%) of production
** *Duars* account for 79.5 tonnes (or 9.4%) of production
*** DOF statistics for 1992-93: mean for Comilla, Sylhet and Mymensigh districts

Table H.44: Summary of Fish Production by Habitat Type Nominal period: August 1995 to July 1996

Habitat	Production (tonnes)	% Total
Kalni-Kushiyara River	798	1.5
Other flowing rivers	848	1.6
Closed and dead rivers	453	0.8
Distributaries	152	0.3
Floodplain (net of other habitats)	41,554	76.2
Beels	6,711	12.3
Ponds	4,036	7.4
Total	54,552	100.0

Table H.45: Comparison of Standing Crop Index between Floodplain and Riverine Habitats

Habitat	Index (Kg/ha/yr)
Floodplain	159.7
Beels	503.1
Kalni-Kushiyara River	201.8
Duars (Kalni River)	441.9
Open rivers	273.2
Closed rivers	121.7

Table H.46: Estimation of Fish production in Rivers (Nominal period: August 1995 to July 1996)

Habitat	Standing Crop (kg/ha/yr)	Section Length (km)	Section Width (m)	Section Area (ha)	Production (tonnes)	% Total
Kalni-Kushiyara River mainstream channel (inclusive of *duars*)						
Kaktai to Fenchuganj	263.1	8.82	116	102	27	
Fenchuganj to Sherpur (107)	263.1	43.43	181	888	234	
Sherpur to Markuli	204.3	36.89	228	943	193	
Markuli to Saudersiri (100)	145.5	4.00		80	12	
Suadersiri to Badalpur	169.2	16.78	228	383	65	
Badalpur to Ajmiriganj (101)	192.9	9.00		282	54	
Ajmiriganj to Katkhal (104)	167.9	11.00		322	54	
Katkhal to Kalma	167.9	42.43	225	955	160	
Subtotal		**172.35**		**3,955**	**798**	**38.0**
Other Flowing Rivers *						
Khowai River	273.1			268	73	
Ratna River	273.1			1,075	294	
Old Surma River	273.1			1,048	286	
Darain River	273.1			435	119	
Cherapur Khal	273.1			158	43	
Sutang River	273.1			120	33	
Subtotal				**3,104**	**848**	**40.4**
Closed and Dead Rivers						
Bashira River **	225.7			166	37	
Bibiyana Channel ***	115.9			416	48	
Old Kushiyara (131)	157.1			484	76	
Sadipur Khal ***	115.9			435	50	
Kamarkhali Nadi ***	115.9			245	28	
Baida River ***	115.9			189	22	
Dhaleswari River ***	115.9			734	85	
Old Kalni River (130)	74.7			394	29	
Barbhanga Nadi ***	115.9			355	41	
Itakhola Nadi ***	115.9			303	35	
Subtotal				**3,721**	**453**	**21.6**
TOTAL RIVER PRODUCTION ESTIMATE				**10,780**	**2,099**	**100.0**

Note: * Standing crop estimate is mean of Kalni (105) and Sinai (106)

** Standing crop estimate adjusted for open reach of Sinai River (106)

*** Standing crop estimate is mean of Kalni (130) and Old Kushiyara (131)

Table H.47: Estimation of Fish Production of River *Duars*
Nominal period: August 1995 to July 1996

River	No of *Duars*	*Duars* Area (ha) *	Standing Crop (kg/ha/yr)	Production (tonnes)
Kushiyara	41	410	441.9	181.2
Kalni	31	310	441.9	137.0
Subtotal	**72**	**720**		**318.2**
Old Surma	10	100	441.9	44.2
Baulai	8	80	441.9	35.4
Subtotal	**18**	**180**		**79.6**
TOTAL	90	900		397.8

* Average area of a *duar* is 10 ha

Table H.48: Monthly Fish production at Riverine Sampling Sites

Reach/Site	Mainstream Kalni-Kushiyara River Channel				Mainstream Kalni River *Duars*			Open Rivers		Closed Rivers	
	Kashmur/ Sherpur	Markuli/ Sauder	Badgal/ Ajmiriganj	Ajmiriganj/ Kathkal	Gudimukh	Mahtabpur	Shahebnagar	Kalni (Derai)	Sinai	Kalni (Markuli)	Old Kushiyara
Site No.	107	100	101	104	121	122	123	105	106	130	131
Site length (km)	7	4	9	11				4	3	4	4
Site area (ha)	140	80	180	220	9	10	14	60	18	60	60
Production (Kg)											
Jan-95	-	-	-	-	-	-	-	-	-	-	-
Feb-95	-	-	5,579	4,768	1,794	-	3,117	-	-	-	-
Mar-95	-	-	4,593	3,482	493	549	669	-	-	-	-
Apr-95	-	-	4,347	2,261	103	105	508	-	-	-	-
May-95	-	-	1,514	3,155	56	34	70	-	-	-	-
Jun-95	-	-	4,736	2,901	263	423	128	-	-	-	-
Jul-95	-	-	1,557	3,319	54	15	84	327	-	-	-
Aug-95	1,935	458	2,416	1,738	230	171	247	1,410	-	611	2,366
Sep-95	2,817	1,108	1,092	1,749	84	134	349	980	-	387	950
Oct-95	3,049	1,721	1,809	3,311	408	85	128	1,090	-	517	718
Nov-95	2,259	1,446	3,010	3,780	53	60	25	756	-	863	176
Dec-95	1,303	604	5,308	7,462	459	3,281	4,972	734	319	455	981
Jan-96	600	2,132	3,643	4,185	269	278	693	561	1,273	269	1,206
Feb-96	1,789	537	3,690	2,929	864	202	756	1,149	1,125	157	998
Mar-96	4,441	876	4,150	2,663	210	317	430	1,761	1,146	154	318
Apr-96	6,085	594	2,411	2,169	124	56	138	818	918	256	617
May-96	6,986	504	2,496	2,462	11	-	9	664	290	124	523
Jun-96	3,815	984	2,433	2,580	16	-	7	2,381	632	-	-
Jul-96	1,754	674	2,257	1,915	57	13	41	333	336	689	572
Aug-96	1,935	815	1,724	1,928	24	10	10	1,104	468	918	971
Standing Crop Index (kg/ha/month)											
Jan-95	-	-	-	-	-	-	-	-	-	-	-
Feb-95	-	-	31	22	199	-	223	-	-	-	-
Mar-95	-	-	26	16	55	55	48	-	-	-	-
Apr-95	-	-	24	10	11	11	36	-	-	-	-
May-95	-	-	8	14	6	3	5	-	-	-	-
Jun-95	-	-	26	13	29	42	9	-	-	-	-
Jul-95	-	-	9	15	6	1	6	5	-	-	-
Aug-95	14	6	13	8	26	17	18	23	-	10	39
Sep-95	20	14	6	8	9	13	25	16	-	6	16
Oct-95	22	22	10	15	45	9	9	18	-	9	12
Nov-95	16	18	17	17	6	6	2	13	-	14	3
Dec-95	9	8	29	34	51	328	355	12	18	8	16
Jan-96	4	27	20	19	30	28	50	9	71	4	20
Feb-96	13	7	21	13	96	20	54	19	63	3	17
Mar-96	32	11	23	12	23	32	31	29	64	3	5
Apr-96	43	7	13	10	14	6	10	14	51	4	10
May-96	50	6	14	11	1	-	1	11	16	2	9
Jun-96	27	12	14	12	2	-	0	40	35	-	-
Jul-96	13	8	13	9	6	1	3	6	19	11	10
Aug-96	14	10	10	9	3	1	1	18	26	15	16

Table H.49: Monthly and Annual Standing Crop Index at Riverine Sampling Sites

	MAINSTREAM KALNI-KUSHIYARA RIVER CHANNEL				MAINSTREAM KALNI RIVER *DUARS*			OPEN RIVERS		CLOSED RIVERS	
Reach/Site	Kashmur/ Sherpur	Markuli/ Sauder	Badgal/ Ajmiriganj	Ajmiriganj/ Kathkal	Gudimukh	Mahtabpur	Shahebnagar	Kalni (Derai)	Sinai	Kalni (Markuli)	Old Kushiyara
Site No.	107	100	101	104	121	122	123	105	106	130	131
Site length (km)	7	4	9	11				4	3	4	4
Site area (ha)	140	80	180	220	9	10	14	60	18	60	60
Standing Crop Index (kg/ha/month)											
Aug-95	13.8	5.7	13.4	7.9	25.5	17.1	17.6	23.5	-	10.2	39.4
Sep-95	20.1	13.9	6.1	7.9	9.3	13.4	24.9	16.3	-	6.5	15.8
Oct-95	21.8	21.5	10.0	15.1	45.3	8.5	9.1	18.2	-	8.6	12.0
Nov-95	16.1	18.1	16.7	17.2	5.9	6.0	1.8	12.6	-	14.4	2.9
Dec-95	9.3	7.5	29.5	33.9	51.0	328.1	355.1	12.2	17.7	7.6	16.4
Jan-96	4.3	26.7	20.2	19.0	29.9	27.8	49.5	9.3	70.7	4.5	20.1
Feb-96	12.8	6.7	20.5	13.3	96.0	20.2	54.0	19.1	62.5	2.6	16.6
Mar-96	31.7	10.9	23.1	12.1	23.3	31.7	30.7	29.3	63.7	2.6	5.3
Apr-96	43.5	7.4	13.4	9.9	13.7	5.6	9.8	13.6	51.0	4.3	10.3
May-96	49.9	6.3	13.9	11.2	1.2	0.0	0.6	11.1	16.1	2.1	8.7
Jun-96	27.3	12.3	13.5	11.7	1.8	0.0	0.5	39.7	35.1	0.0	0.0
Jul-96	12.5	8.4	12.5	8.7	6.3	1.3	2.9	5.6	18.7	11.5	9.5
Total	**263.1**	**145.5**	**192.9**	**167.9**	**309.3**	**459.7**	**556.7**	**210.6**	**335.5**	**74.7**	**157.1**

Table H.50: Monthly Fish Production at Floodplain Habitat Sampling Sites

	FLOODPLAIN					BEELS			
Site	Kumarpara	Gazaria	Shahnagar	Kakailseo	Katkhal	Bheramonha	Biddyakhola	Dhuiya	Borogop
Site No.	114	PU 1	PU 2	PU 4	PU 5	132	113	112	111
Site area (ha)	20.23	6	6	3.32	5	50	40	29.14	12.14
Production (kg)									
Jan-95	-	-	-	-	-	-	-	-	-
Feb-95	0	-	-	-	-	-	178	3791	-
Mar-95	0	-	-	-	-	-	326	758	1914
Apr-95	0	-	-	-	-	-	333	670	723
May-95	0	-	-	-	-	-	46	55	155
Jun-95	0	-	-	-	-	-	69	214	536
Jul-95	622	-	-	-	-	-	257	327	526
Aug-95	827	248	268	308	593	1262	520	975	604
Sep-95	404	54	61	168	160	842	179	153	264
Oct-95	554	114	122	91	179	1130	361	163	320
Nov-95	328	168	0	206	119	500	694	104	349
Dec-95	0	33	0	-	112	909	1009	1458	6528
Jan-96	0	0	0	-	53	577	15	2416	1781
Feb-96	0	0	0	-	0	2024	603	1004	4625
Mar-96	0	0	0	-	0	3026	350	2625	106
Apr-96	0	-	0	-	0	868	540	676	624
May-96	0	-	0	-	46	664	63	107	126
Jun-96	0	-	0	-	0	532	286	222	275
Jul-96	74	-	29	-	112	316	118	192	111
Aug-96	889	-	39	-	113	732	600	743	852
Standing Crop Index (kg/ha/month)									
Jan-95	-	-	-	-	-	-	-	-	-
Feb-95	0.00	-	-	-	-	-	4.4	130.1	-
Mar-95	0.0	-	-	-	-	-	8.2	26.0	157.7
Apr-95	0.0	-	-	-	-	-	8.3	23.0	59.6
May-95	0.0	-	-	-	-	-	1.1	1.9	12.8
Jun-95	0.0	-	-	-	-	-	1.7	7.3	44.1
Jul-95	30.8	-	-	-	-	-	6.4	11.2	43.4
Aug-95	40.9	41.3	44.7	92.9	118.5	25.2	13.0	33.5	49.7
Sep-95	20.0	9.1	10.2	50.6	32.0	16.8	4.5	5.3	21.7
Oct-95	27.4	19.0	20.3	27.3	35.9	22.6	9.0	5.6	26.4
Nov-95	16.2	28.0	0.0	62.0	23.8	10.0	17.4	3.6	28.8
Dec-95	0.0	5.5	0.0	-	22.4	18.2	25.2	50.0	537.7
Jan-96	0.0	0.0	0.0	-	10.7	11.5	0.4	82.9	146.7
Feb-96	0.0	0.0	0.0	-	0.0	40.5	15.1	34.4	380.9
Mar-96	0.0	0.0	0.0	-	0.0	60.5	8.8	90.1	8.7
Apr-96	0.0	-	0.0	-	0.0	17.4	13.5	23.2	51.4
May-96	0.0	-	0.0	-	9.2	13.3	1.6	3.7	10.4
Jun-96	0.0	-	0.0	-	0.0	10.6	7.2	7.6	22.6
Jul-96	3.7	-	4.8	-	22.4	6.3	2.9	6.6	9.2
Aug-96	44.0	-	6.6	-	22.7	14.6	15.0	25.5	70.2

Table H.51: Monthly and Annual Standing Crop Index at Floodplain Habitat Sampling Sites

	FLOODPLAIN					*BEELS*			
Site	Kumarpara	Gazaria	Shahnagar	Kakailseo	Katkhal	Bheramonha	Biddyakhola	Dhuiya	Borogop
Site No.	114	PU 1	PU 2	PU 4	PU 5	132	113	112	111
Site area (ha)	20.23	6	6	3.32	5	50	40	29.14	12.14
	Standing Crop Index (kg/ha/month)								
Aug-95	40.9	41.3	44.7	92.9	118.5	25.2	13.0	33.5	49.7
Sep-95	20.0	9.1	10.2	50.6	32.0	16.8	4.5	5.3	21.7
Oct-95	27.4	19.0	20.3	27.3	35.9	22.6	9.0	5.6	26.4
Nov-95	16.2	28.0	0.0	62.0	23.8	10.0	17.4	3.6	28.8
Dec-95	0.0	5.5	0.0	-	22.4	18.2	25.2	50.0	537.7
Jan-96	0.0	0.0	0.0	-	10.7	11.5	0.4	82.9	146.7
Feb-96	0.0	0.0	0.0	-	0.0	40.5	15.1	34.4	380.9
Mar-96	0.0	0.0	0.0	-	0.0	60.5	8.8	90.1	8.7
Apr-96	0.0	-	0.0	-	0.0	17.4	13.5	23.2	51.4
May-96	0.0	-	0.0	-	9.2	13.3	1.6	3.7	10.4
Jun-96	0.0	-	0.0	-	0.0	10.6	7.2	7.6	22.6
Jul-96	3.7	-	4.8	-	22.4	6.3	2.9	6.6	9.2
Total	**108.1**	**102.8**	**79.9**	**232.9**	**275.0**	**253.0**	**118.5**	**346.4**	**1294.3**

Table H.52: Species Composition of Catch during Peak Fishing Month

Habitat	Site	% of Total Standing Crop Index								Peak Month
		Native carp	Introduced carp	Other large species	Subtotal Large finfish	Small finfish	Golda chingri	Icha	Total	
RIVERINE HABITATS										
Mainstream river channel	Kushiyara 107	5.1	0.0	24.9	29.9	63.0	1.8	5.3	100.0	May-96
	Kalni 100	11.6	0.0	49.9	61.5	35.3	2.4	0.8	100.0	Jan-96
	Kalni 101	36.1	0.0	51.8	87.9	11.2	0.9	0.0	100.0	Dec-95
	Kalni 104	6.2	0.0	27.1	33.3	59.2	1.5	6.0	100.0	Dec-95
Mainstream *duars*	Gudimukh 121	9.8	0.0	80.6	90.4	9.6	0.0	0.0	100.0	Feb-96
	Matabpur 122	20.0	0.0	80.0	100.0	0.0	0.0	0.0	100.0	Dec-95
	Shahebnagar 123	23.5	0.0	59.5	83.0	17.0	0.0	0.0	100.0	Dec-95
Other open rivers	Kalni 105	13.3	1.1	5.3	19.7	70.6	5.2	4.5	100.0	Jun-96
	Sinai 106	2.1	0.0	10.1	12.2	76.3	0.0	11.5	100.0	Jan-96
Closed rivers	Kalni 130	3.4	0.0	12.1	15.5	67.9	0.0	16.7	100.0	Aug-96
	Old Kushiyara 131	5.6	0.0	18.1	23.7	57.5	11.2	7.6	100.0	Jan-96
FLOODPLAIN HABITATS										
Floodplains	Kumarpara 114	0.0	0.0	35.9	35.9	12.0	52.1	0.0	**100.0**	Aug-95
	Gazaria PU1	1.0	0.0	17.0	18.0	73.0	0.0	9.0	**100.0**	Aug-95
	Shahnagar PU2	2.0	0.0	19.0	21.0	73.0	0.0	6.0	**100.0**	Aug-95
	Kakailseo PU4	3.0	0.0	14.0	17.0	79.0	0.0	4.0	**100.0**	Aug-95
	Katkhal PU5	9.0	0.0	22.0	31.0	59.6	0.0	9.5	**100.0**	Aug-95
Beels	Bharamona 132	27.8	3.3	17.9	49.0	41.8	6.5	2.7	**100.0**	Mar-96
	Biddyakhola 113	47.8	0.0	0.0	47.8	44.1	0.0	8.1	**100.0**	Dec-95
	Dhuiya 112	13.7	0.0	4.9	18.6	68.2	10.3	2.9	**100.0**	Jan-96
	Borogop 111	16.7	0.0	44.4	61.1	33.9	3.0	2.0	**100.0**	Dec-95

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 1 of 6)

Day	1964					1965					1966					1967				
	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct
1		7,410	11,300	9,930	9,000	3,230	7,840	9,620	12,000	9,620	2,430	10,700	11,600	14,200	11,300	2,370	5,580	11,600	8,120	8,120
2		7,500	11,400	9,850	8,830	3,710	8,140	9,710	12,000	9,460	2,690	11,000	11,500	14,300	11,000	2,300	5,580	11,300	7,980	7,980
3		7,500	11,600	9,930	8,740	4,160	8,290	9,790	11,900	9,310	3,080	11,300	11,500	14,400	10,800	2,430	5,580	11,100	8,120	7,980
4		7,470	11,800	10,000	8,570	4,390	8,290	9,790	11,700	9,150	3,540	11,600	11,300	14,400	10,700	2,540	5,580	10,700	7,780	7,870
5	2,720	7,410	12,000	10,100	8,400	4,530	8,220	9,880	11,600	8,990	3,740	11,700	11,300	14,400	10,400	2,690	5,580	10,200	7,780	7,870
6	2,770	7,580	12,200	10,300	8,490	4,530	8,220	9,960	11,400	8,740	3,910	11,900	11,200	14,400	10,200	2,880	5,580	9,760	7,670	7,870
7	2,910	7,640	12,300	10,400	9,000	4,330	8,290	10,100	11,200	8,600	3,990	12,000	11,000	14,300	9,960	3,110	5,800	9,570	7,670	7,780
8	3,060	7,810	12,300	10,400	8,830	4,300	8,450	10,400	11,000	8,450	4,240	12,000	10,900	14,300	9,790	3,480	6,000	9,570	7,580	7,670
9	3,170	8,150	12,300	10,400	8,660	4,390	8,520	10,500	10,900	8,290	4,640	11,900	10,800	14,300	9,530	3,620	6,230	9,760	7,580	7,580
10	3,280	8,400	12,300	10,500	8,490	4,610	8,600	10,600	10,700	8,070	5,040	11,900	10,800	14,300	9,350	3,790	6,590	9,760	7,390	7,470
11	3,420	8,570	12,200	10,400	8,400	4,810	8,910	10,700	10,700	7,910	5,720	12,100	10,800	14,100	9,090	3,910	7,190	9,760	7,270	7,470
12	3,710	8,830	12,100	10,400	8,240	5,090	8,990	10,800	10,700	7,760	6,370	12,300	11,000	13,900	8,910	4,240	7,780	9,570	7,080	7,390
13	4,100	9,000	12,000	10,400	8,070	5,350	9,230	11,000	10,700	7,530	7,610	12,600	11,200	13,800	8,910	4,640	8,120	9,340	6,990	7,190
14	4,700	9,080	11,900	10,300	7,900	5,580	9,380	11,300	10,600	7,300	8,830	12,600	11,400	13,600	8,830	4,700	8,490	9,110	6,880	6,990
15	5,010	9,080	11,800	10,300	7,730	5,910	9,540	11,400	10,600	7,080	8,740	12,600	11,500	13,600	8,830	4,810	8,740	9,000	6,790	6,790
16	5,200	9,170	11,600	10,200	7,500	5,910	9,620	11,600	10,500	6,860	9,350	12,800	11,500	13,700	8,740	4,810	9,110	9,000	6,740	6,650
17	5,690	9,420	11,400	10,100	7,330	6,250	9,620	11,600	10,400	6,640	9,610	12,900	11,700	13,600	8,570	4,810	9,340	9,000	6,740	6,590
18	5,970	9,590	11,400	10,000	7,080	6,820	9,540	11,700	10,400	6,360	10,100	12,800	11,900	13,500	8,320	4,950	10,200	9,000	6,740	6,420
19	6,170	9,760	11,200	9,930	6,990	7,130	9,620	11,800	10,400	6,160	10,300	12,800	11,900	13,300	8,070	5,090	10,900	9,000	6,790	6,230
20	6,590	9,930	11,000	9,930	7,240	7,130	9,620	11,900	10,300	5,950	10,500	12,700	11,900	13,200	7,900	5,320	11,300	8,860	6,880	6,080
21	6,450	10,000	11,000	9,850	7,240	7,130	9,540	11,900	10,500	5,760	10,600	12,700	11,800	13,100	7,490	5,490	11,600	8,860	6,990	5,940
22	6,620	10,000	10,900	9,850	7,080	7,130	9,540	11,800	10,300	5,630	10,800	12,500	11,700	12,900	7,260	5,860	11,900	8,740	7,080	5,800
23	6,680	10,200	10,800	9,760	7,240	7,330	9,460	11,700	10,200	5,760	10,800	12,400	12,000	12,700	7,010	6,170	12,200	8,740	7,390	5,580
24	6,820	10,300	10,700	9,760	7,160	7,500	9,380	11,700	10,100	5,690	10,900	12,300	12,300	12,500	6,700	4,750	12,500	8,600	7,580	5,380
25	6,930	10,300	10,600	9,680	7,080	7,730	9,380	11,800	10,100	5,630	10,900	12,200	12,700	12,200	6,460	4,950	12,700	8,490	7,670	5,210
26	6,990	10,400	10,500	9,590	6,990	7,920	9,380	11,700	9,960	5,500	10,900	12,100	13,400	12,100	6,230	5,120	12,700	8,490	7,780	5,070
27	7,080	10,400	10,400	9,510	6,930	8,150	9,380	11,600	9,960	5,370	10,900	12,100	13,700	11,800	6,000	5,210	12,700	8,490	7,780	4,900
28	7,160	10,400	10,400	9,340	6,850	8,320	9,310	11,800	9,880	5,240	10,900	12,000	13,900	11,600	5,850	5,320	12,500	8,380	7,870	4,700
29	7,160	10,600	10,300	9,170	6,680	8,550	9,380	12,000	9,880	5,020	10,800	11,800	14,100	11,300	5,700	5,430	12,500	8,240	7,870	4,500
30	7,240	11,000	10,200	9,080	6,540	9,000	9,380	12,100	9,790	4,740	10,600	11,700	14,100	11,100	5,550	5,520	12,500	8,240	8,120	4,330
31		11,100	10,000		6,310		9,460	12,100		5,310	10,500		14,200		5,410		12,200	8,120		4,190
Min	**2,720**	**7,410**	**10,000**	**9,080**	**6,310**	**3,230**	**7,840**	**9,620**	**9,790**	**4,740**	**2,430**	**10,700**	**10,800**	**11,100**	**5,410**	**2,300**	**5,580**	**8,120**	**6,740**	**4,190**
Mean	**5,292**	**9,161**	**11,352**	**9,979**	**7,729**	**6,031**	**9,049**	**11,108**	**10,679**	**7,028**	**7,840**	**12,133**	**11,955**	**13,363**	**8,350**	**4,344**	**9,202**	**9,302**	**7,423**	**6,503**
Max	**7,240**	**11,100**	**12,300**	**10,500**	**9,000**	**9,000**	**9,620**	**12,100**	**12,000**	**9,620**	**10,900**	**12,900**	**14,200**	**14,400**	**11,300**	**6,170**	**12,700**	**11,600**	**8,120**	**8,120**
Year					8,808					8,785					10,702					7,374

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 2 of 6)

	1968					1969					1970					1972				
Day	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct
1	3,510	7,360	13,000	10,000	7,610		6,960	9,110	11,500	7,580	3,280	8,860	12,800	11,000	9,820	3,480	9,620	10,600	8,090	5,690
2	3,570	7,440	13,000	9,760	7,530		7,080	9,000	11,500	7,390	3,280	8,950	12,900	10,900	10,100	3,480	9,820	10,800	7,870	5,550
3	3,760	7,530	13,000	9,620	7,530	3,200	7,190	9,000	11,500	7,240	3,340	8,950	13,000	10,800	10,100	3,510	9,820	10,900	7,640	5,320
4	3,910	7,610	13,000	9,480	7,530	3,370	7,220	8,970	11,400	7,050	3,450	9,050	13,100	10,700	10,300	3,510	9,820	11,100	7,640	5,180
5	4,080	7,700	12,700	9,480	7,440	3,340	7,220	8,940	11,200	6,880	3,630	9,150	13,100	10,700	10,500	3,510	9,820	11,100	7,870	5,070
6	4,160	7,780	12,500	9,480	7,530	3,340	7,190	8,860	11,200	6,680	3,810	9,050	13,200	10,500	10,600	3,570	9,620	11,300	7,980	4,950
7	4,330	7,780	12,500	9,340	7,530	3,340	7,130	8,800	11,200	6,480	4,000	9,050	13,200	10,300	10,700	3,570	9,480	11,300	8,090	4,870
8	4,530	8,120	12,300	9,200	7,440	3,420	7,220	8,710	11,000	6,340	4,320	8,950	13,300	10,200	10,700	3,590	9,340	11,300	8,210	4,810
9	4,640	8,290	12,300	9,060	7,530	3,450	7,360	8,550	10,900	6,230	4,600	8,860	13,400	9,920	10,700	3,590	9,060	11,300	8,210	4,700
10	4,810	8,550	12,300	8,890	7,440	3,570	7,500	8,430	10,700	6,110	4,730	8,680	13,400	9,720	10,600	3,590	8,910	11,500	8,350	4,700
11	5,090	8,290	12,100	8,800	7,440	3,650	7,750	8,430	10,600	6,110	4,800	8,680	13,700	9,530	10,500	3,620	8,770	11,500	8,350	4,700
12	5,260	8,970	11,800	8,720	7,360	3,820	8,010	8,380	10,400	5,970	4,800	8,590	13,800	9,440	10,400	3,590	8,630	11,300	8,350	4,560
13	5,580	9,340	11,400	8,550	7,360	3,990	8,120	8,380	10,400	5,860	4,870	8,680	13,700	9,240	10,300	3,590	8,490	11,100	8,350	4,440
14	5,800	9,760	11,200	8,550	7,130	4,130	8,260	8,350	10,300	5,740	4,800	8,950	13,600	9,150	10,100	3,620	8,210	11,100	8,090	4,360
15	6,310	10,300	10,900	8,380	6,960	4,240	8,320	8,430	10,200	5,600	5,000	9,240	13,400	9,050	9,930	3,650	7,980	10,800	7,980	4,240
16	6,310	10,900	10,700	8,210	6,790	4,440	8,350	8,490	10,000	5,430	5,140	9,530	13,300	9,240	9,820	3,850	7,870	10,600	7,750	4,100
17	4,670	11,200	9,620	8,120	6,570	4,670	8,490	8,740	9,880	5,290	5,280	9,920	13,300	9,340	9,620	3,930	7,750	10,400	7,530	4,020
18	4,670	11,400	10,200	8,120	6,450	4,870	8,800	9,400	9,680	5,120	5,350	10,100	13,300	9,440	9,420	3,960	7,640	10,200	7,300	3,930
19	4,700	11,600	10,000	8,800	6,250	5,070	8,910	9,570	9,480	4,950	5,500	10,300	13,100	9,720	9,060	4,020	7,530	9,990	7,190	3,850
20	4,900	11,600	10,000	7,870	6,060	5,260	8,940	8,740	9,340	4,780	5,720	10,500	13,100	9,720	8,860	4,160	7,530	9,620	6,960	3,790
21	5,150	11,800	9,900	7,780	5,940	5,380	9,000	9,900	9,170	4,610	6,020	10,600	12,800	9,820	8,570	4,300	7,420	9,480	6,760	3,760
22	5,320	12,100	9,900	7,610	5,770	5,520	9,080	10,200	8,940	4,500	6,310	10,700	12,700	9,820	8,320	4,560	7,640	9,200	6,680	3,740
23	5,600	12,300	9,900	7,610	5,660	5,740	9,110	10,400	8,740	4,390	6,790	11,000	12,400	9,820	8,120	5,070	7,750	9,060	6,570	3,680
24	5,830	12,500	9,620	7,530	5,490	6,000	9,110	10,500	8,550	4,300	7,190	11,300	12,200	9,820	8,040	6,000	7,870	8,910	6,570	3,680
25	6,060	12,700	9,480	7,530	5,380	6,230	9,110	10,400	8,410	4,240	7,530	11,700	12,000	9,720	8,040	6,960	7,980	8,630	6,480	3,620
26	6,310	13,000	9,620	7,700	5,090	6,400	9,110	10,700	8,260	4,160	7,870	11,900	11,900	9,630	7,870	7,870	7,980	8,630	6,400	3,590
27	6,570	13,000	9,620	7,700	5,240	6,540	9,140	10,900	8,150	4,080	8,220	12,300	11,700	9,630	7,700	8,490	7,980	8,630	6,340	3,480
28	6,740	13,000	9,900	7,700	4,950	6,650	9,170	11,100	7,980	3,990	8,500	12,500	11,500	9,720	7,360	8,910	8,630	8,490	6,170	3,400
29	6,960	13,300	10,000	7,700	4,750	6,760	9,230	11,200	7,900	3,850	8,680	12,500	11,400	9,720	7,270	9,340	9,200	8,490	6,000	3,280
30	7,130	13,000	10,200	7,610	4,560	6,880	9,230	11,300	7,730	3,760	8,770	12,600	11,200	9,720	7,100	9,480	9,620	8,350	5,860	3,200
31		13,000	10,200		4,390		9,110	11,400		3,590		12,600	11,100		6,930		10,200	8,210		3,080
Min	**3,510**	**7,360**	**9,480**	**7,530**	**4,390**	**3,200**	**6,960**	**8,350**	**7,730**	**3,590**	**3,280**	**8,590**	**11,100**	**9,050**	**6,930**	**3,480**	**7,420**	**8,210**	**5,860**	**3,080**
Mean	5,209	10,362	11,060	8,497	6,474	4,760	8,272	9,461	9,874	5,429	5,519	10,121	12,794	9,868	9,273	4,812	8,645	10,125	7,388	4,237
Max	**7,130**	**13,300**	**13,000**	**10,000**	**7,610**	**6,880**	**9,230**	**11,400**	**11,500**	**7,580**	**8,770**	**12,600**	**13,800**	**11,000**	**10,700**	**9,480**	**10,200**	**11,500**	**8,350**	**5,690**
Year					8,339					7,599					9,539					7,054

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 3 of 6)

Day	1973					1974					1975					1976				
	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct
1	4,850	11,600	10,700	11,400	11,100	6,680	9,880	18,500	12,900	11,400	3,230	5,240	12,500	10,800	8,210	3,340	12,000	12,700	12,600	7,780
2	5,690	11,800	10,900	11,100	10,900	6,620	9,930	18,500	13,000	11,400	3,110	5,240	12,600	10,800	8,070	3,370	12,900	12,000	12,500	7,610
3	5,690	12,100	11,100	10,900	10,900	6,680	10,400	18,500	13,100	11,500	2,860	5,240	12,600	10,800	8,010	3,480	13,900	11,500	12,300	7,300
4	5,780	12,200	11,200	10,800	10,800	6,850	9,680	18,200	13,100	11,800	2,750	5,260	12,600	10,800	8,010	3,570	14,500	11,200	12,100	7,020
5	5,970	12,300	11,400	10,700	10,700	6,930	11,200	18,500	13,100	11,800	2,720	5,350	12,700	10,700	7,980	3,570	15,000	11,100	11,700	6,790
6	6,000	12,300	11,500	10,600	10,400	6,990	11,900	19,100	13,100	11,700	2,770	5,350	12,700	10,700	7,900	3,570	15,300	11,200	11,500	6,590
7	6,100	12,300	11,700	10,400	10,200	7,020	12,300	19,500	13,100	11,600	2,890	5,520	12,700	10,800	7,780	3,590	15,600	11,300	11,300	6,400
8	6,160	12,300	11,900	10,300	10,100	7,020	12,500	19,500	13,000	11,400	3,060	5,720	12,500	10,800	7,700	3,620	15,900	11,600	11,200	6,230
9	6,230	12,200	12,100	10,200	9,970	7,100	12,600	19,100	12,900	11,300	3,590	5,890	12,500	10,800	7,560	4,500	16,000	11,800	11,000	6,060
10	6,370	12,000	12,200	10,100	9,790	7,220	12,700	18,800	12,800	11,100	3,760	6,140	12,500	10,900	7,560	5,150	16,200	11,900	10,800	5,910
11	6,510	12,000	12,300	10,100	9,610	7,300	12,700	18,200	12,700	10,900	3,820	6,340	12,500	10,900	7,470	5,860	16,300	11,900	10,600	5,690
12	6,650	11,900	12,300	9,970	9,510	7,360	12,600	17,900	12,700	10,800	3,990	6,510	12,300	10,800	7,610	6,370	16,300	11,900	10,300	5,520
13	6,790	11,600	12,300	9,970	9,330	7,360	12,500	17,300	12,700	10,500	4,100	6,590	12,200	10,700	7,640	6,880	16,400	11,800	10,100	5,290
14	6,930	11,400	12,300	9,880	9,330	7,410	12,400	16,800	12,700	10,300	4,190	6,680	11,900	10,700	7,700	7,810	16,500	11,700	9,880	5,010
15	7,080	11,200	12,400	9,970	9,050	7,410	12,300	16,200	12,900	10,200	4,080	6,960	11,800	10,600	7,640	8,690	16,700	11,700	9,710	4,810
16	7,220	11,100	12,400	10,100	8,960	7,440	12,200	15,700	13,100	10,100	3,960	7,300	11,600	10,700	7,700	9,310	16,700	11,500	9,510	4,580
17	7,430	10,900	12,300	10,200	8,770	7,500	12,200	15,500	13,400	9,880	3,930	7,580	11,400	10,800	7,560	9,790	16,600	11,500	9,400	4,330
18	7,870	10,800	12,300	11,100	8,580	7,560	12,500	15,300	13,400	9,680	3,960	7,980	11,200	10,900	7,560	10,200	16,600	11,500	9,230	4,130
19	8,300	10,700	12,300	11,200	8,410	7,580	12,900	15,300	13,200	9,570	4,080	8,260	11,000	10,900	7,560	10,600	16,400	11,600	9,080	4,020
20	8,820	10,400	12,300	11,300	8,180	7,640	13,200	14,900	13,100	9,420	4,190	8,490	10,900	10,600	7,560	10,800	16,100	11,700	8,910	3,990
21	9,240	10,200	12,300	11,300	7,950	7,750	13,400	14,900	13,000	9,170	4,300	8,630	10,800	10,400	7,610	10,700	15,900	11,500	8,740	3,990
22	9,510	10,100	12,300	11,500	7,710	7,840	13,500	14,800	12,800	9,030	4,390	9,110	10,800	9,880	7,560	10,900	15,500	11,600	8,600	3,960
23	9,790	9,880	12,300	11,600	7,500	8,260	14,000	14,500	12,700	8,860	4,410	9,570	10,800	9,480	7,470	11,000	15,100	11,800	8,320	3,960
24	10,100	9,790	12,200	11,600	7,220	8,720	14,000	14,200	12,600	8,720	4,500	9,820	10,800	9,030	7,440	11,000	15,000	11,900	8,120	4,020
25	10,100	9,790	12,100	11,600	7,080	9,030	14,100	14,000	12,400	8,600	4,580	10,200	10,900	8,690	7,360	11,000	14,900	11,600	8,150	3,960
26	10,300	9,700	11,900	11,500	6,930	9,230	14,200	13,700	12,200	8,490	4,670	10,600	10,900	8,430	7,160	10,800	14,900	12,100	8,040	3,910
27	10,600	9,700	11,800	11,500	6,990	9,420	14,500	13,200	12,000	8,490	4,900	10,900	10,900	8,260	7,020	10,600	14,700	12,300	8,290	3,680
28	10,800	9,790	11,700	11,400	6,460	9,480	15,100	12,900	11,800	8,380	5,150	11,200	11,000	8,260	6,760	10,500	14,000	12,400	8,090	3,510
29	11,000	9,880	11,600	11,300	6,230	9,680	15,700	12,800	11,700	8,380	5,240	11,500	10,900	8,260	6,510	10,700	13,500	12,500	8,040	3,110
30	11,300	10,100	11,600	11,100	5,780	9,740	16,800	12,700	11,500	8,260	5,240	12,000	10,900	8,260	6,250	11,300	13,300	12,700	7,920	3,110
31		10,400	11,500		5,840		17,900	12,800		8,210		12,300	10,900		6,000		13,100	12,700		2,860
Min	**4,850**	**9,700**	**10,700**	**9,880**	**5,780**	**6,620**	**9,680**	**12,700**	**11,500**	**8,210**	**2,720**	**5,240**	**10,800**	**8,260**	**6,000**	**3,340**	**12,000**	**11,100**	**7,920**	**2,860**
Mean	7,839	11,046	11,910	10,823	8,719	7,761	12,961	16,187	12,757	10,030	3,947	7,854	11,687	10,148	7,481	7,752	15,219	11,813	9,868	5,004
Max	**11,300**	**12,300**	**12,400**	**11,600**	**11,100**	**9,740**	**17,900**	**19,500**	**13,400**	**11,800**	**5,240**	**12,300**	**12,700**	**10,900**	**8,210**	**11,300**	**16,700**	**12,700**	**12,600**	**7,780**
Year					10,077					11,961					8,239					9,946

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 4 of 6)

Day	1981					1982					1983					1984				
	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct
1		4,910	10,600	10,400	9,740		8,720	12,600	9,600	9,200	5,120	7,810	11,900	15,800	13,100	8,140	9,390	13,500	9,390	12,500
2		6,510	10,800	10,300	9,680		8,720	12,600	9,510	9,140	4,990	7,920	12,000	15,700	12,900	8,140	9,290	13,400	9,710	12,300
3		5,630	11,000	10,200	9,590		9,060	12,900	9,430	9,040	4,810	8,260	12,300	15,600	12,700	8,050	9,130	13,300	9,760	12,100
4		5,920	11,100	10,100	9,350		9,220	13,100	9,390	8,930	4,570	8,790	13,100	15,500	12,500	8,080	9,050	13,200	9,740	11,900
5		6,440	11,100	10,000	9,100		9,300	13,300	9,330	8,860	4,380	9,420	13,700	15,300	12,300	8,070	8,990	13,300	9,730	11,800
6		6,980	11,200	10,000	8,820		9,500	13,400	9,320	8,730	4,250	9,900	13,900	15,200	12,200	8,130	8,940	13,200	9,870	11,700
7		7,410	11,100	10,100	8,580		9,760	13,500	9,280	8,570	4,180	10,500	14,000	15,200	12,100	8,220	9,080	13,100	10,300	11,500
8		7,790	11,100	10,000	8,310		9,950	13,400	9,200	8,380	4,070	11,000	14,100	15,500	11,900	8,190	9,190	13,000	10,500	11,500
9		8,120	11,000	10,100	8,060		10,100	13,400	9,030	8,170	4,070	11,400	14,100	15,500	11,800	8,080	9,500	12,800	10,700	11,300
10		8,360	10,900	10,100	7,800		10,300	13,300	8,910	7,920	4,020	11,700	14,000	15,600	11,600	7,950	9,960	12,600	10,900	11,200
11		8,580	10,800	10,200	7,570		10,400	13,200	8,870	7,630	4,060	11,900	14,000	15,900	11,500	7,870	10,400	12,500	11,000	11,000
12		8,620	10,800	10,200	7,330		10,600	13,000	8,700	7,350	4,050	11,800	13,900	16,000	11,400	7,760	10,800	12,300	11,000	10,800
13		8,600	10,700	10,400	7,100		10,800	12,800	8,540	7,080	4,140	11,700	13,800	16,000	11,300	7,680	11,200	12,200	11,100	10,600
14		8,460	10,500	10,500	6,840		11,000	12,600	8,440	6,850	4,290	11,600	13,700	16,000	11,200	7,730	11,700	12,000	11,000	10,400
15		8,560	10,400	10,600	6,630		11,200	12,400	8,400	6,590	4,400	11,400	13,500	15,800	11,200	7,710	12,200	11,700	11,100	10,300
16		8,560	10,300	10,700	6,410		11,400	12,100	8,460	6,430	4,520	11,200	13,300	15,800	11,100	7,670	12,600	11,600	11,900	10,000
17	5,770	8,680	10,200	10,700	6,140		11,500	11,900	8,850	6,230	4,600	11,000	13,200	15,700	11,000	7,650	12,800	11,300	12,500	9,650
18	5,790	8,860	10,100	10,700	5,870		11,500	11,700	9,000	6,100	4,740	11,200	13,000	15,600	11,000	7,960	13,000	11,100	12,900	9,380
19	5,780	9,040	10,100	10,700	5,580	5,510	11,600	11,500	9,110	5,920	5,080	10,900	12,900	15,400	11,000	8,510	13,200	10,900	13,200	9,120
20	5,770	9,180	10,100	10,800	5,280	5,800	11,600	11,300	9,180	5,700	5,310	10,800	12,800	15,300	10,900	8,700	13,000	10,700	13,400	8,820
21	5,800	9,330	10,100	10,600	5,000	6,050	11,600	11,200	9,250	5,460	5,430	10,700	12,700	15,100	10,700	8,930	12,900	10,600	13,500	8,510
22	5,780	9,450	10,100	10,600	4,720	6,370	11,600	11,000	9,210	5,200	5,510	10,600	12,800	15,100	10,800	9,120	12,800	10,300	13,600	8,450
23	5,660	9,510	10,000	10,500	4,460	6,730	11,500	10,800	9,400	4,920	5,660	10,500	13,200	15,000	10,900	9,250	12,900	9,980	13,500	8,340
24	5,480	9,620	10,000	10,400	4,200	7,300	11,600	10,700	9,470	4,760	5,940	10,500	13,600	14,800	10,800	9,360	13,300	9,770	13,400	8,200
25	5,370	9,680	10,300	10,300	4,010	7,640	11,700	10,500	9,490	4,380	6,280	10,500	14,200	14,600	10,800	9,430	13,400	9,610	13,300	8,090
26	5,240	9,640	10,400	10,200	3,870	7,930	11,900	10,300	9,490	3,990	6,740	10,500	14,700	14,300	10,700	9,480	13,400	9,510	13,200	7,850
27	5,140	9,650	10,500	10,100	3,740	8,170	12,100	10,200	9,470	3,660	7,060	10,600	15,100	14,100	10,500	9,490	13,400	9,430	13,100	7,590
28	4,920	9,750	10,600	10,000	3,670	8,360	12,300	9,990	9,420	3,340	7,330	10,800	15,300	13,900	10,300	9,480	13,400	9,400	13,000	7,260
29	4,730	9,880	10,700	9,920	3,490	8,590	12,300	9,860	9,360	3,120	7,490	11,000	15,400	13,600	10,100	9,460	13,600	9,310	12,900	6,910
30	4,660	10,100	10,600	9,850	3,360	8,680	12,400	9,760	9,250	2,940	7,690	11,300	15,500	13,300	9,780	9,440	13,600	9,250	12,700	6,530
31		10,400	10,500		3,250		12,600	9,670		2,860		11,600	15,600		9,470		13,600	9,350		6,100
Min	**4,660**	**4,910**	**10,000**	**9,850**	**3,250**	**5,510**	**8,720**	**9,670**	**8,400**	**2,860**	**4,020**	**7,810**	**11,900**	**13,300**	**9,470**	**7,650**	**8,940**	**9,250**	**9,390**	**6,100**
Mean	5,421	8,459	10,571	10,309	6,373	7,261	10,898	11,870	9,145	6,369	5,159	10,606	13,719	15,207	11,276	8,458	11,604	11,426	11,730	9,732
Max	**5,800**	**10,400**	**11,200**	**10,800**	**9,740**	**8,680**	**12,600**	**13,500**	**9,600**	**9,200**	**7,690**	**11,900**	**15,600**	**16,000**	**13,100**	**9,490**	**13,600**	**13,500**	**13,600**	**12,500**
Year					8,559					9,369					11,207					10,596

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 5 of 6)

Day	1985					1986					1987					1988				
	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct
1	2,600	8,650	14,200	10,200	9,460	2,450	4,120	7,870	8,450	8,340	2,050	8,100	12,900	12,000	13,900	12,200	15,100	13,200	17,500	13,100
2	3,250	8,810	14,300	10,100	9,430	2,320	4390	7,970	8,440	8,430	2,150	8,830	13,600	11,900	13,700	12,900	15,300	12,600	17,400	12,700
3	3,500	8,910	14,100	10,100	9,360	2,300	4490	8,170	8,530	8,550	2,900	9,360	14,200	11,900	13,500	13,100	15,300	12,000	17,100	12,300
4	4,000	9,070	13,900	10,000	9,280	2,350	4700	8,310	8,630	8,670	3,210	9,860	14,600	11,700	13,200	13,000	15,400	11,500	17,000	11,800
5	4,200	9,150	13,700	10,200	9,150	2,400	4880	8,450	8,590	8,740	3,810	10,100	14,900	11,600	12,900	12,900	16,300	11,200	17,300	11,500
6	4,650	9,260	13,500	10,100	9,000	2,500	4980	8,610	8,500	8,890	3,710	10,300	15,000	11,500	12,700	12,800	17,400	11,200	17,300	11,200
7	4,950	9,370	13,100	9,990	8,730	2,560	5140	8,690	8,420	9,100	3,700	10,400	15,000	11,400	12,400	12,600	18,400	11,300	17,200	11,300
8	5,150	9,460	12,900	10,000	8,460	2,650	5390	8,720	8,330	9,360	3,540	10,600	15,000	11,400	12,200	12,300	19,300	11,300	16,900	11,300
9	5,400	9,640	12,700	10,000	8,200	2,850	5560	8,770	8,270	9,920	3,460	10,800	15,000	11,300	12,200	12,000	19,700	11,200	17,200	11,200
10	5,800	9,900	12,400	9,990	7,930	2,950	5750	8,730	8,220	9,950	3,560	10,800	14,900	11,200	12,100	11,600	19,700	11,100	17,600	11,000
11	6,050	10,300	12,000	10,100	7,670	3,100	5710	8,690	8,200	9,950	3,720	10,900	14,900	11,100	12,000	11,200	19,800	11,100	17,800	10,900
12	6,200	10,600	11,700	10,000	7,420	3,070	5820	8,660	8,280	9,940	4,010	11,000	15,100	11,100	11,900	10,900	19,700	11,300	17,800	10,700
13	6,300	10,800	11,300	10,000	7,150	3,070	5880	8,590	8,340	9,900	4,300	11,000	15,200	10,900	11,700	10,600	19,500	11,800	17,900	10,600
14	6,400	11,000	11,000	10,100	6,870	3,040	6020	8,450	8,390	9,780	4,620	10,900	15,000	10,800	11,600	10,300	19,300	12,400	17,800	10,400
15	8,740	11,300	10,800	10,100	6,740	3,060	6070	8,320	8,470	9,740	4,730	10,900	14,700	10,800	11,400	9,980	19,000	13,100	17,700	10,200
16	8,770	11,500	10,600	10,200	6,740	3,200	6040	8,180	8,620	9,670	4,900	10,800	14,400	10,700	11,100	9,660	18,500	13,500	17,500	9,890
17	8,930	11,700	10,400	10,200	6,890	3,300	6090	8,050	8,800	9,930	4,950	10,700	14,100	10,600	10,900	9,560	18,100	13,900	17,300	9,570
18	9,130	11,800	10,200	10,100	6,750	3,320	6080	8,000	9,010	10,200	4,980	10,700	13,800	10,400	10,700	9,490	17,600	14,100	17,200	9,260
19	9,340	11,900	10,100	9,990	6,500	3,400	6170	7,920	9,210	10,400	5,000	10,500	13,400	10,200	10,400	9,250	17,000	14,000	16,800	9,170
20	9,360	12,000	9,870	9,980	6,160	3,350	6200	7,930	8,980	10,600	5,130	10,400	13,100	10,000	10,200	9,070	16,500	14,000	16,400	9,180
21	9,340	12,000	9,640	9,880	5,950	3,900	6250	7,870	8,750	10,800	5,300	10,200	12,900	9,850	10,200	8,980	16,000	13,800	16,200	9,140
22	9,230	12,200	9,570	9,760	5,710	4,100	6340	7,760	8,500	10,900	5,420	10,100	12,900	9,770	10,000	8,940	15,700	13,700	15,900	9,000
23	9,210	12,300	9,600	9,740	5,450	4,310	6530	7,730	8,240	11,100	5,460	9,940	12,800	9,570	9,700	8,920	15,500	13,600	15,600	8,860
24	9,100	12,400	9,670	9,690	5,230	4,310	6650	7,800	7,930	10,800	5,530	10,000	12,600	9,370	9,380	9,550	15,300	13,700	15,300	8,720
25	9,030	12,600	9,900	9,570	5,080	4,410	6830	7,880	7,570	10,400	5,520	10,300	12,500	9,880	9,060	10,300	15,300	13,900	15,000	8,550
26	8,860	12,900	10,100	9,370	4,880	3,370	7010	8,070	7,670	10,000	5,760	10,800	12,500	10,400	8,760	11,500	15,400	14,300	14,600	8,390
27	8,650	13,000	10,200	9,410	4,660	3,450	7170	8,170	7,970	9,630	6,160	11,000	12,300	11,400	8,410	12,800	15,400	14,900	14,100	8,220
28	8,470	13,100	10,300	9,430	4,520	3,460	7330	8,240	8,140	9,240	6,630	11,200	12,300	12,200	8,070	13,700	15,400	15,700	13,800	8,110
29	8,450	13,600	10,300	9,460	4,250	3,530	7520	8,280	8,170	8,850	7,100	11,400	12,300	12,900	7,670	14,400	14,900	16,500	13,800	7,950
30	8,400	14,000	10,300	9,460	4,090	3,830	7680	8,320	8,250	8,410	7,560	11,600	12,200	13,400	7,330	14,900	14,300	17,100	13,500	7,770
31		14,100	10,300		3,820		7780	8,380		8,070		12,300	12,100		6,950		13,800	17,400		7,540
Min	2,600	8,650	9,570	9,370	3,820	2,300	4,120	7,730	7,570	8,070	2,050	8,100	12,100	9,370	6,950	8,920	13,800	11,100	13,500	7,540
Mean	7,049	11,204	11,376	9,907	6,824	3,197	6,018	8,245	8,396	9,621	4,629	10,509	13,748	11,041	10,846	11,313	16,900	13,239	16,483	9,985
Max	9,360	14,100	14,300	10,200	9,460	4,410	7,780	8,770	9,210	11,100	7,560	12,300	15,200	13,400	13,900	14,900	19,800	17,400	17,900	13,100
Year					9,282					7,112					10,185					13,580

Table H.53: Mean Daily Discharge of Upper Meghna River at Bhairab Bazar (station 273)
(Page 6 of 6)

Day	1989					1990					1991					1992					1993	
	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul	Aug	Sep	Oct	Jun	Jul
1	4,130	10,300	15,000	11,600	10,400	6,310	10,300	11,100	10,300	9,810	12,300	14,100	9,800	10,200	13,300					7,978		15,992
2	4,370	10,200	15,300	11,700	10,500	6,620	10,400	11,300	10,000	10,100	12,500	14,000	9,940	10,200	13,100		7,303					
3	4,630	10,000	15,500	11,700	10,500	6,880	10,500	11,200	9,750	10,200	12,500	13,900	10,100	10,800	13,000				8,060			
4	4,960	10,100	15,500	11,800	10,400	7,050	10,500	11,000	9,520	10,400	12,600	13,900	10,300	11,500	12,700							
5	5,230	10,300	15,400	12,000	10,300	7,240	10,700	10,900	9,290	10,500	12,600	13,800	10,600	12,000	12,600						7,061	
6	5,520	10,500	15,300	12,300	10,300	7,460	10,700	10,800	9,060	10,500	12,600	13,800	10,900	12,100	12,400	3,529		9,648				
7	5,840	11,200	15,200	12,500	10,400	7,680	10,700	10,800	8,940	10,400	12,600	13,800	11,200	12,200	12,200							
8	6,090	11,700	15,100	12,400	10,300	7,950	10,600	10,600	8,760	10,700	12,600	13,700	11,500	12,400	11,900					8,090		18,268
9	6,020	12,100	15,000	12,200	10,400	8,420	10,900	10,500	8,660	10,900	12,600	13,700	11,500	12,600	11,700		12,499					
10	5,880	12,400	14,900	12,100	10,900	8,820	11,000	10,400	8,650	10,900	12,600	13,600	11,400	12,800	11,500	3,314			6,931		9,431	
11	5,730	12,900	14,900	12,000	11,200	9,120	11,000	10,300	8,620	11,000	12,500	13,600	11,500	12,900	11,400							
12	5,690	13,500	14,800	11,900	11,400	9,430	11,000	10,600	8,580	11,200	12,400	13,400	11,500	13,000	11,300							
13	5,730	13,500	14,600	11,700	11,400	9,720	11,000	10,800	8,480	11,400	12,500	13,200	11,400	13,200	11,500			9,325				
14	5,970	13,600	14,300	11,700	11,200	10,000	11,000	10,900	8,390	11,500	12,600	13,000	11,300	13,300	11,800							
15	6,240	13,800	14,100	11,700	11,100	10,100	11,000	11,100	8,300	11,500	12,800	12,800	11,200	13,400	11,900					7,416		15,230
16	6,410	13,900	14,100	11,600	11,000	10,100	10,900	11,200	8,200	11,600	13,000	12,600	11,100	13,400	12,300		12,574					
17	6,620	13,900	14,100	11,500	10,800	10,100	10,800	10,900	8,180	11,700	13,300	12,200	10,900	13,300	12,600				7,169		13,329	
18	7,090	14,000	14,000	11,400	11,000	9,990	10,700	10,700	8,510	11,700	13,500	11,900	10,700	13,200	12,500	4,447						
19	7,620	14,200	13,800	11,500	11,000	9,940	10,700	10,400	8,560	11,500	13,900	11,800	10,400	13,100	12,300							
20	8,130	14,300	13,700	11,600	11,100	9,880	10,700	10,200	8,620	11,400	14,100	11,800	10,200	13,000	12,000							
21	8,510	14,300	13,700	11,500	11,000	9,830	10,700	9,900	8,600	11,200	14,300	11,800	9,990	13,000	11,800			7,805				
22	8,720	14,200	13,600	11,400	10,900	9,880	10,500	9,670	8,540	11,100	14,300	11,600	9,740	12,800	11,500					6,584		19,234
23	9,060	14,100	13,500	11,300	10,800	9,800	10,400	9,440	8,460	10,800	14,300	11,500	9,720	12,700	11,200		11,900					
24	9,260	13,900	13,300	11,100	10,600	9,940	10,300	9,560	8,430	10,500	14,400	11,400	9,610	12,600	10,900				6,574		17,145	
25	9,500	13,700	13,000	11,000	10,500	10,100	10,100	9,720	8,400	10,200	14,500	11,300	9,580	12,700	10,600	4,825						
26	9,820	13,400	12,700	10,800	10,400	10,100	9,860	9,960	8,410	9,770	14,500	11,100	9,630	13,100	10,400							
27	10,100	13,000	12,400	10,600	10,200	10,100	10,100	10,200	8,460	9,370	14,500	10,800	9,640	13,500	10,200			7,422				
28	10,300	12,900	12,100	10,400	10,100	10,100	10,300	10,400	8,680	8,970	14,400	10,700	9,670	13,500	9,910							
29	10,500	12,900	11,900	10,500	9,840	10,100	10,500	10,600	9,270	8,490	14,300	10,400	9,670	13,500	9,610					5,631		17,486
30	10,700	13,800	11,800	10,400	9,590	10,200	10,800	10,800	9,530	8,030	14,200	10,200	9,860	13,400	9,270		10,960					
31		14,500	11,600		9,310		11,000	10,500		7,600		9,940	10,100		9,010							
Min	4,130	10,000	11,600	10,400	9,310	6,310	9,860	9,440	8,180	7,600	12,300	9,940	9,580	10,200	9,010	3,314	7,303	7,422	6,574	5,631	7,061	15,230
Mean	7,146	12,810	14,006	11,530	10,608	9,099	10,634	10,531	8,805	10,482	13,327	12,430	10,473	12,647	11,561	4,029	11,047	8,550	7,184	7,140	11,742	17,242
Max	10,700	14,500	15,500	12,500	11,400	10,200	11,000	11,300	10,300	11,700	14,500	14,100	11,500	13,500	13,300	4,825	12,574	9,648	8,060	8,090	17,145	19,234
Year					11,245					9,923					12,076					-		-

Table H.54: Mean Monsoon Discharge of Upper Meghna River at Bhairab Bazar (Station 273)
(Period: 1 June to 31 October)

Year	Discharge (m^3/s)
1964	8,808
1965	8,785
1966	10,702
1967	7,374
1968	8,340
1969	7,599
1970	9,539
1971	-
1972	7,054
1973	10,077
1974	11,961
1975	8,239
1976	9,946
1977	
1978	-
1979	-
1980	-
1981	8,559
1982	9,369
1983	11,207
1984	10,596
1985	9,282
1986	7,112
1987	10,185
1988	13,580
1989	11,245
1990	9,923
1991	12,076
1992	-
1993	-
Mean	**9,633**

Table H.55: Upper Meghna River Discharge and Fish Purchases of Ajmiriganj Fish Industries

	1985	1986	1987	1988	1989	1990	1991
Discharge (m3/s)	9,282	7,112	10,185	13,580	11,245	9,923	12,076
Finfish (kg)	180,613	179,018	191,065	382,840	237,438	136,160	131,986
Golda chingri (kg)	137,964	105,067	76,085	193,642	121,750	180,525	201,334
Total (kg)	**318,577**	**284,085**	**267,150**	**576,482**	**359,188**	**316,685**	**333,320**

Table H.56: Correlation of Mean Discharge with Fish Production

Data Source	Fisheries Statistics	Regression Coefficient r	Degrees of Freedom	Probability
AFI	Finfish purchased (year X)	0.588	5	P>0.1
AFI	Finfish purchased (year X+1)	0.115	5	P>0.1
AFI	Prawns exported (year X)	0.429	8	P>0.1
AFI	Prawns exported (year X+1)	0.492	8	P>0.1
AFI	Finfish exported (year X)	0.612	8	0.1>P>0.05
AFI	Finfish exported (year X)	0.662	9	0.05>P>0.02
AFI	Finfish exported mean of (year X and X+1)	0.743	8	0.02>P>0.01
DOF	Capture fisheries regional total (year X)	0.565	4	P>0.1
DOF	Capture fisheries regional total (year X+1)	0.088	4	P>0.1

Table H.57: River Channel Depth and Standing Crop of Kalni-Kushiyara River Channel

River Section	Mean Depth (m)	Standing Crop (kg/ha/yr)
Observed		
Markuli to Katkhal	5	168.8
Kashimpur to Sherpur	8	253.1
Predicted by Equation		
	1	56.4
	2	84.5
	3	112.6
	4	140.7
	5	168.8
	6	196.9
	7	225.0
	8	253.1
	9	281.2
	10	309.3
	11	337.4
	12	365.5
	13	393.6
	14	421.7
	15	449.8
	16	477.9
	17	506.0
	18	534.1
	19	562.2
	20	590.3

Table H.58: *Beel* Maximum Depth and Fish Standing Crop

Beel	Maximum Depth (m)	Standing Crop (kg/ha/yr)
Bheramohonha	10.0	253.0
Biddyakhola	3.0	118.5
Dhuiya	3.7	346.4
Borogop	7.6	1,294.3

Table H.59: *Beel* Siltation Rates in Project Area
(Period: 15-20 years)

Beel	Present		Previous		Loss				Deposition (m3)	Rate of Siltation (m3/yr)	Rate of Area Build-up * (ha/yr)
	Area (ha)	Depth (m)	Area (ha)	Depth (m)	Area (ha)	Depth (m)	Area (%)	Depth (%)			
Bheramona	232.1	6.1	445.2	16.8	213.1	10.7	46.8	63.6	60,476,868	3,023,843	5.3
Biddiyakhola	12.1	3.0	14.2	4.6	2.0	1.5	14.3	33.3	277,533	13,877	0.2
Dhuiya-Wara	29.1	3.7	32.4	5.5	3.2	1.8	10.0	33.3	710,485	35,524	0.2
Gordair	40.5	4.6	80.9	10.7	40.5	6.1	50.0	57.1	6,784,149	339,207	0.2
Dhuiya-Shahebnagar	4.0	2.1	8.9	4.6	4.9	2.4	54.5	53.3	320,705	16,035	0.2
Kaita	16.2	2.1	22.3	4.6	6.1	2.4	27.3	53.3	672,248	33,612	0.2
Burinnail	24.3	3.0	28.3	4.6	4.0	1.5	14.3	33.3	555,067	27,753	0.2
Borogop	513.8	7.6	566.6	10.7	52.8	3.0	9.3	28.5	21,290,511	1,064,526	1.3
Mean							**28.5**	**44.5**			* approximated

Table H.60: Trend in Loss of *Beel* Area in Project Area

Years from present	Total area (ha)
0	5,172
5	4,979
10	4,787
15	4,598
20	4,411
25	4,229
30	4,077

Table H.61: Expected Project Impacts on Fish production

Habitat Group	Habitat Type	Present Production (tonnes)	FWO Production (tonnes)	FW Production (tonnes)	Impact vs Present (tonnes)	Impact vs FWO (tonnes)
Riverine	KK River w/o *duars*	480	404	780	300	376
	KK River *duars*	318	303	315	(3)	12
	Subtotal	**798**	**707**	**1,095**	**297**	**388**
	Other flowing rivers	848	848	1,018	170	170
	Closed & dead rivers	453	439	453	-	14
	Distributaries	152	147	182	30	35
	Subtotal	**2,251**	**2,141**	**2,748**	**497**	**607**
Floodplain	Floodplain	41,554	40,723	39,476	(2,078)	(42,801)
	Beels	6,711	5,684	7,047	336	1,363
	Ponds	4,036	3,834	4,440	404	606
	Subtotal	**52,301**	**50,241**	**50,963**	**(1,338)**	**722**
TOTAL		**54,552**	**52,382**	**53,711**	**(841)**	**1,329**
Fish Availability (Kg/person/yr)		**28.80**	**18.20**	**18.65**	**(10.15)**	**0.45**

Table H.62: Expected Impacts of Katkhal Loop Cut on Local *Duars*

Duar No.	Name	Area (ha)	Production (tonne/yr)	Closely Related Flooplains			Total Production (tonne/yr)	Dry Season Depth (m)	With Project Depth (m)	Loss in Depth (m)	% Loss in Depth
				No.	Area (ha)	Production (tonne/yr)					
Duars detached from mainstream channel and semi-isolated in loop by cuts											
2	Matabpur	10	4.41	2	250	39.92	44.33	12.0	5.4	6.6	55.0
4	Srigangmukh (Cherapur Khal)	12	5.3	3	200	31.94	37.24	10.6	8.4	2.2	20.8
5	Kanchanpur	12	5.3	2	250	39.92	45.22	5.4	4.4	1.0	18.5
Duars remaining in straightened mainsteam channel											
1	Santipur	14	6.18	2	300	57.91	64.09	14.2	10.4	3.8	26.8
3	Shahebnagar	14	6.18	3	300	47.91	54.09	15.8	12.4	3.4	21.5
6	Nayakurar Kandi	12	N/A	N/A	N/A	N/A		13.2	10.5	2.7	20.5
	Total						**244.97**				**27.2**
Newly created *duar* in mainstream channel											
	Koysar								10.4		

Table H.63: Occurence of Freshwater Dolphin in Major Rivers in the Northeast Region

District	Adjacent Village	District	Adjacent Village	District	Adjacent Village
River: Kushiyara		**River: Ghorautra**		**River: Surma**	
Sylhet	Amalshid	Kishoreganj	Dighirpar	Sylhet	Laxmiprashad
	Mewa		Sutarpara		Digholi
	Sheolaghat		Dilalpur		Muktigaon
	Kakairdi	**River: Kawnai**			Bausha
Moulvibazar	Abdullahpur	Sunamganj	Daulatpur	Sunamganj	Dwarabazar
	Islampur		Pratappur		Jamlabaz
	Manumukh		Milanpur		Jamalganj
	Perkul		Mukshedpur	**River: Old Surma**	
Habiganj	Digolbagh	**River: Kangsha/Mogra**		Sunamganj	Sujanagar
	Pechirbazar	Netrokona	Bandukhali		Narsinghpur
	Bagmayna		Jaria	Kishoreganj	Katore
	Roail		Chandraghona	**River: Dhanu/Baulai**	
	Markuli		Nazirganj	Sunamganj	Kalipur
	Bheradohor	**River: Piyain**			Dalakandi
River: Kalni		Netrokona	Rangchapur	Netrokona	Gaglajur
Habiganj	Ajmiriganj		Rautala		Barantar
	Abdullapur		Chakua		Laipsa
	Isapur		Elongjuri		Nawtana
River: Upper Meghna		**River: Abbua and Rakti**			Faridpur
Kishoreganj	Echordia	Sunamganj	Behili-Alipur		Jagannathpur
	Chatalpur		Nawagoan		Kaliajuri
	Ainargoop		Mamudpur	Kishoreganj	Pashat
	Mendipur		Joypur		Dhanpur
	Paniswar				Itna
					Elongjuri
					Boribari
					Simulbagh

FIGURES

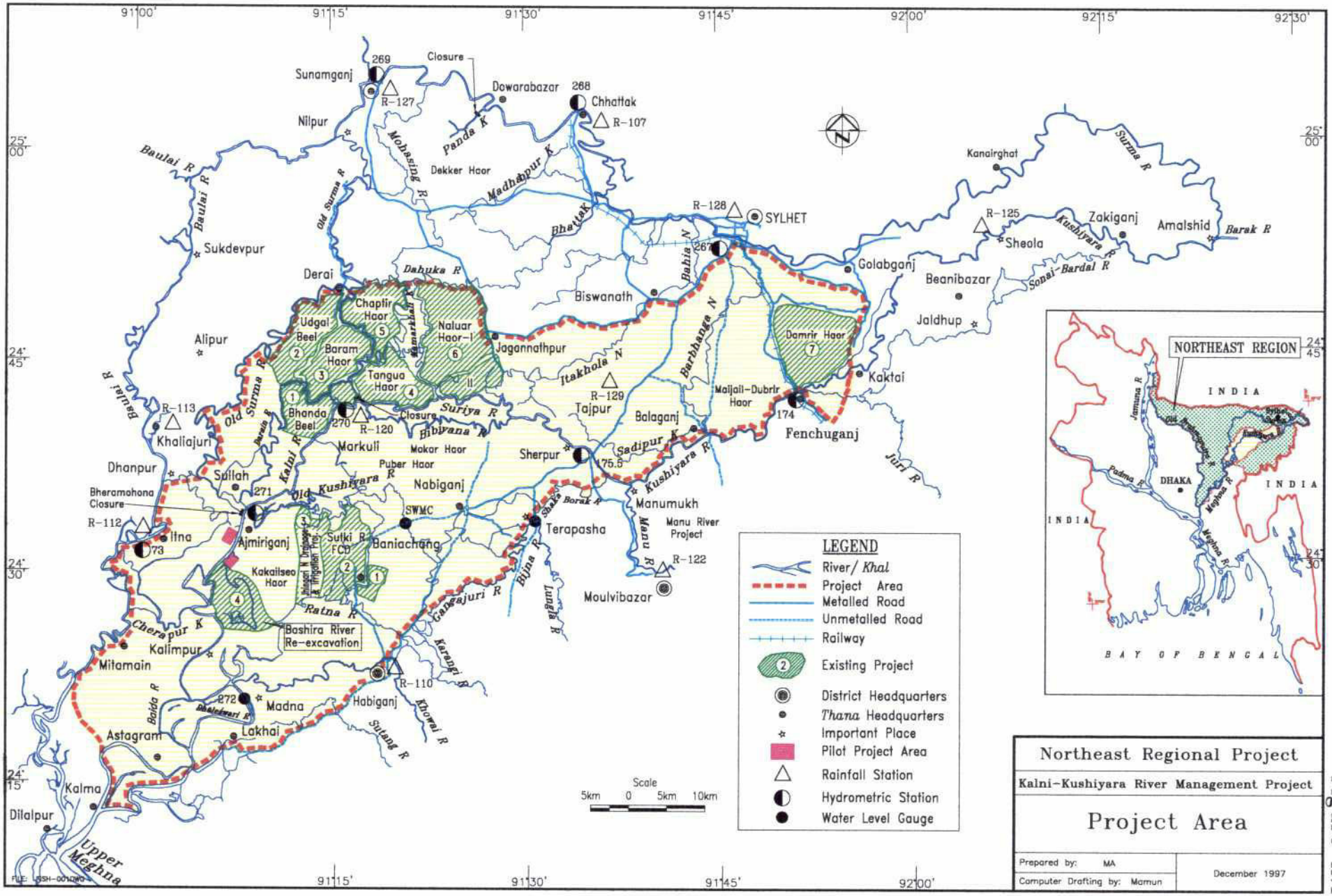
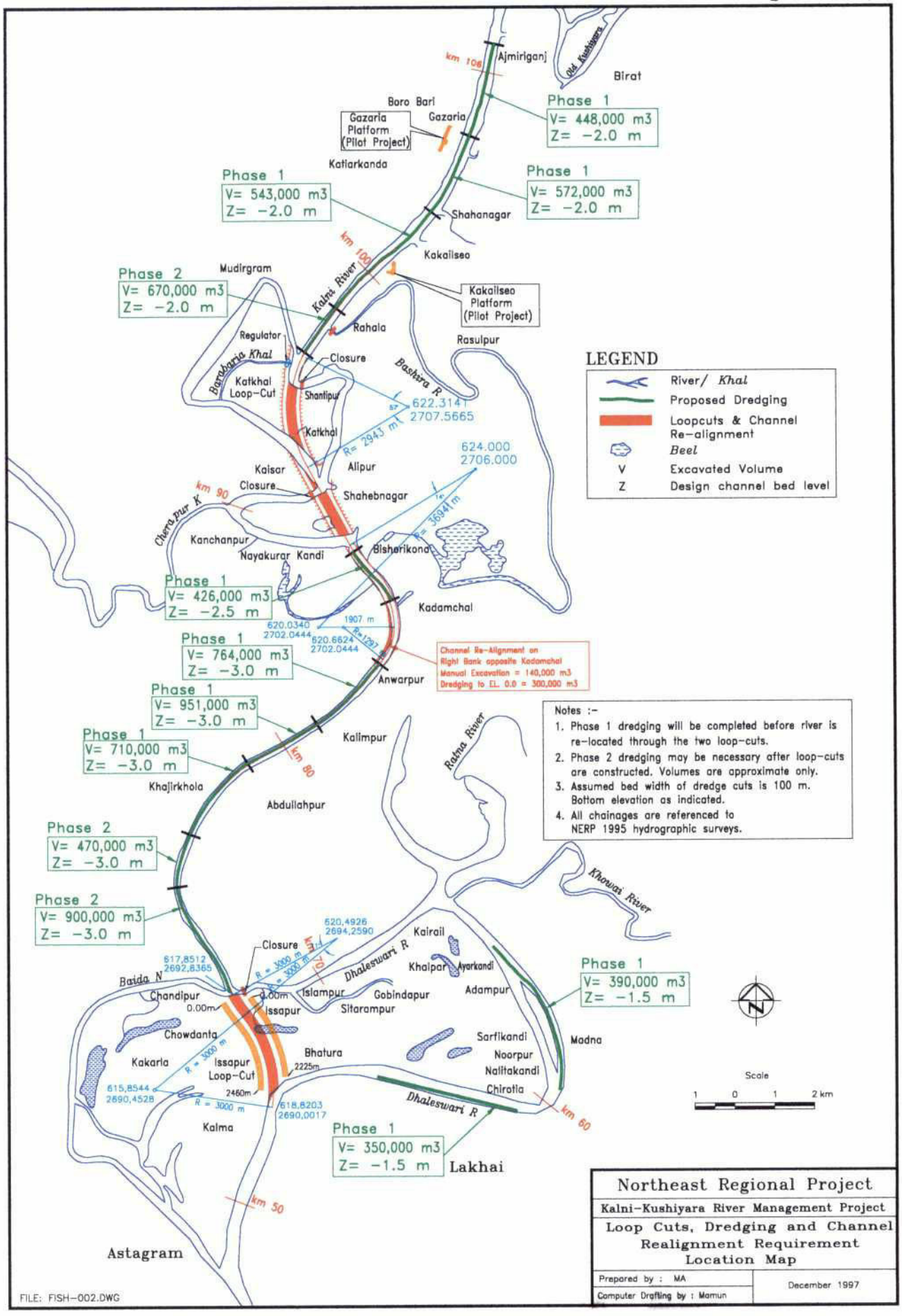
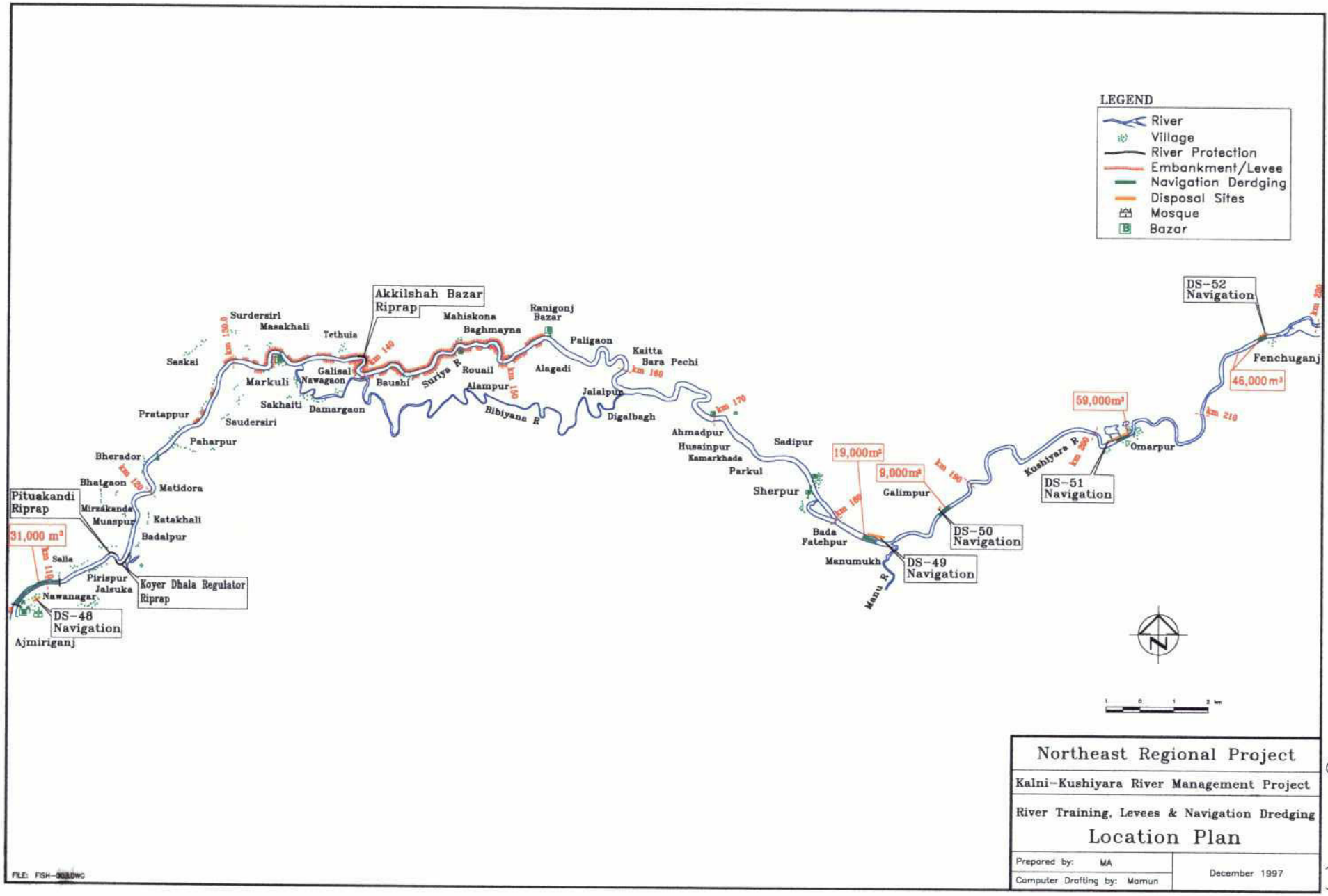

91°00'
91°15'
91°30'
91°45'
92°00'
92°15'
92°30'
25° 00'
24° 45'
24° 30'
24° 15'
Sunamganj
269
Closure
Dowarabazar
268
Chhattak
R-107
R-127
Nilpur
Panda K
Mohasing R
Dekker Haor
Madhapur K
Baulai R
Old Surma R
Sukdevpur
Derai
Dahuka R
Bhetlak
R-128
SYLHET
Kanairghat
Surma R
R-125
Zakiganj
Amalshid
Barak R
Sheola
Kushiyara R
Sonai-Bardal R
Golabganj
Beanibazar
Jaldhup
Biswanath
Pabia N
Jagannathpur
Chaptir Haor
Udgal Beel
Baram Haor
Tangua Haor
Nalua Haor-I
Damrir Haor
Alipur
Itakhola N
Barbhanga N
R-129
Tajpur
Balaganj
Maijail-Dubrir Haor
Kaktai
174
Fenchuganj
R-113
Khaliajuri
Bhanda Beel
270
R-120
Closure
Suriya R
Bibiyana R
Markuli
Makar Haor
Puber Haor
Sherpur
Sadipur K
Kushiyara R
Juri R
Dhanpur
Sullah
271
Nabiganj
Old Kushiyara R
Kalni R
Bheramohona Closure
R-112
Itna
73
Ajmiriganj
SWMC
Sutki R FCD
Baniachang
Kakailseo Haor
Manumukh
Manu River Project
Terapasha
Shaila Borak R
Bijna R
Lungla R
R-122
Moulvibazar
Ratna R
Gangajuri R
Bashira River Re-excavation
Cherapur K
Kalimpur
Mitamain
Karangi R
R-110
Habiganj
272
Madna
Khowai R
Sutang R
Boida R
Dhaleswari R
Astagram
Lakhai
Kalma
Dilalpur
Upper Meghna
FILE: NSH-001.DWG
Scale
5km 0 5km 10km
LEGEND
River/ Khal
Project Area
Metalled Road
Unmetalled Road
Railway
Existing Project
District Headquarters
Thana Headquarters
Important Place
Pilot Project Area
Rainfall Station
Hydrometric Station
Water Level Gauge
NORTHEAST REGION
INDIA
DHAKA
INDIA
INDIA
BAY OF BENGAL
Jamuna R
Padma R
Meghna R
Northeast Regional Project
Kalni-Kushiyara River Management Project
Project Area
Prepared by: MA
Computer Drafting by: Mamun
December 1997

Figure H.1

Figure H.2(a)


Ajmiriganj
km 106
Old Kushiyara
Birat
Boro Bari
Gazaria Platform (Pilot Project)
Gazaria
Katiarkanda
Phase 1
V= 448,000 m3
Z= -2.0 m
Phase 1
V= 543,000 m3
Z= -2.0 m
Phase 1
V= 572,000 m3
Z= -2.0 m
Shahanagar
km 100
Kakailseo
Kakailseo Platform (Pilot Project)
Mudirgram
Phase 2
V= 670,000 m3
Z= -2.0 m
Kalni River
Rahala
Rasulpur
Regulator
Barabaria Khal
Closure
Bashira R
Katkhal Loop-Cut
Shantipur
622.3141
2707.5665
Katkhal
R= 2943 m
624.000
2706.000
Kaisar
Alipur
Closure
km 90
Chera Pur K
Shahebnagar
Kanchanpur
Nayakurar Kandi
Bisharikond
Phase 1
V= 426,000 m3
Z= -2.5 m
Kadamchal
620.0340
2702.0444
620.6624
2702.0444
1907 m
R=1797
Phase 1
V= 764,000 m3
Z= -3.0 m
Channel Re-Alignment on Right Bank opposite Kadamchal
Manual Excavation = 140,000 m3
Dredging to El. 0.0 = 300,000 m3
Anwarpur
Phase 1
V= 951,000 m3
Z= -3.0 m
Kalimpur
Phase 1
V= 710,000 m3
Z= -3.0 m
km 80
Khajirkhola
Abdullahpur
Rahna River
Phase 2
V= 470,000 m3
Z= -3.0 m
Phase 2
V= 900,000 m3
Z= -3.0 m
Khowai River
620.4926
2694.2590
Kairail
Closure
km 70
Dhaleswari R
617.8512
2692.8365
R = 3000 m
Baida N
Khalpar
Ayarkandi
Chandipur
0.00m
Islampur
Gobindapur
Adampur
Issapur
Sitarampur
Phase 1
V= 390,000 m3
Z= -1.5 m
Chowdanta
Sarfikandi
Madna
Kakaria
Issapur Loop-Cut
Bhatura
2225m
Noorpur
Nalitakandi
2460m
615.8544
2690.4528
R = 3000 m
618.8203
2690.0017
Chirotia
Dhaleswari R
km 60
Kalma
Phase 1
V= 350,000 m3
Z= -1.5 m
Lakhai
km 50
Astagram
LEGEND
River/ Khal
Proposed Dredging
Loopcuts & Channel Re-alignment
Beel
V Excavated Volume
Z Design channel bed level
Notes :-
1. Phase 1 dredging will be completed before river is re-located through the two loop-cuts.
2. Phase 2 dredging may be necessary after loop-cuts are constructed. Volumes are approximate only.
3. Assumed bed width of dredge cuts is 100 m. Bottom elevation as indicated.
4. All chainages are referenced to NERP 1995 hydrographic surveys.
N
Scale
1 0 1 2 km
Northeast Regional Project
Kalni-Kushiyara River Management Project
Loop Cuts, Dredging and Channel Realignment Requirement Location Map
Prepared by : MA
Computer Drafting by : Mamun
December 1997
FILE: FISH-002.DWG



Northeast Regional Project

Kalni-Kushiyara River Management Project

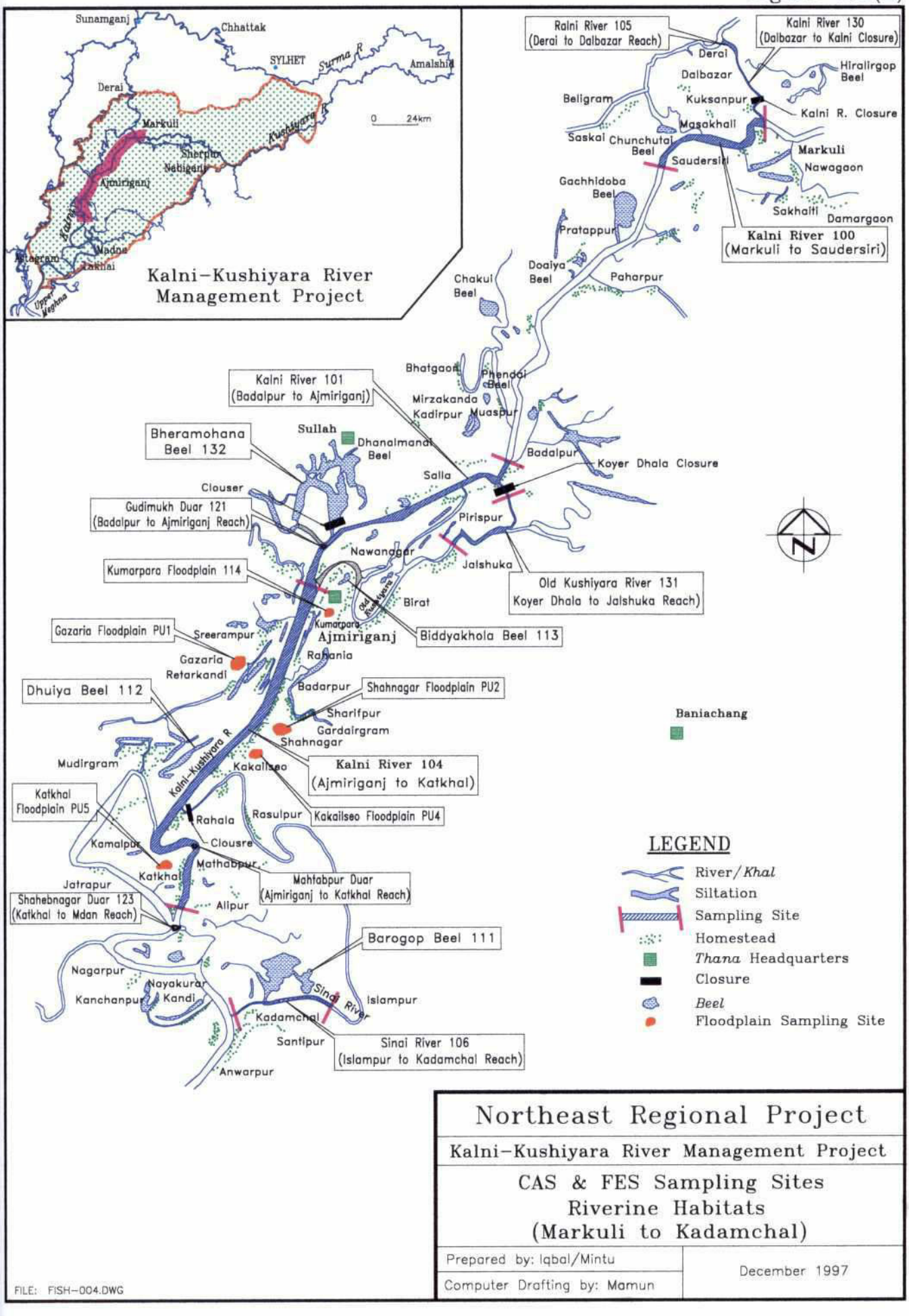
River Training, Levees & Navigation Dredging

Location Plan

Prepared by: MA	December 1997
Computer Drafting by: Momun	

Figure H.2(b)

Figure H.3(a)



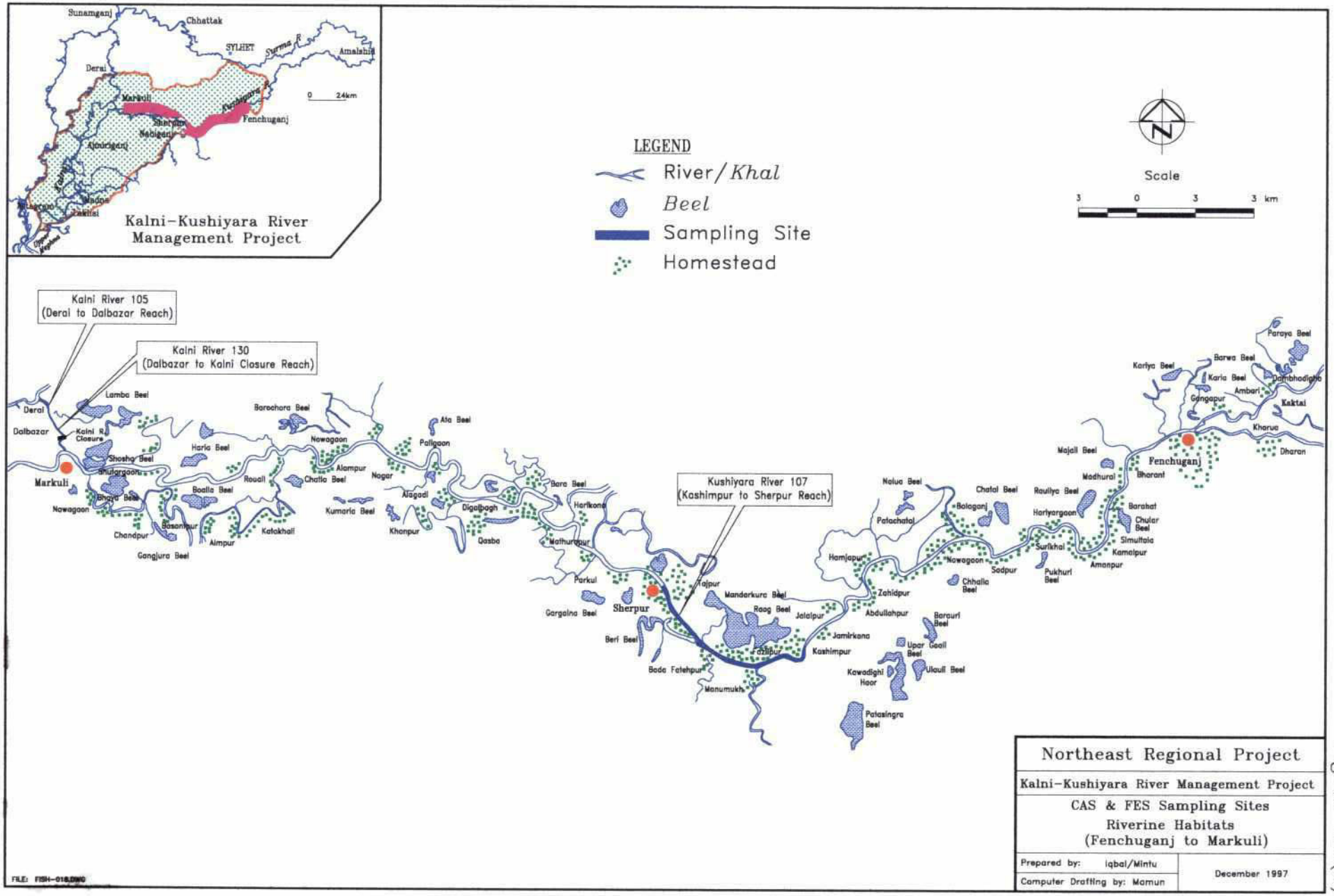
Northeast Regional Project

Kalni–Kushiyara River Management Project

CAS & FES Sampling Sites Riverine Habitats (Markuli to Kadamchal)

Prepared by: Iqbal/Mintu	December 1997
Computer Drafting by: Mamun	

FILE: FISH–004.DWG



Northeast Regional Project	
Kalni–Kushiyara River Management Project	
CAS & FES Sampling Sites Riverine Habitats (Fenchuganj to Markuli)	
Prepared by: Iqbal/Mintu	December 1997
Computer Drafting by: Mamun	

FILE: FISH-01&.DWG

Figure H.3(b)

Figure H.4 Surface Area of Aquatic Habitat Types

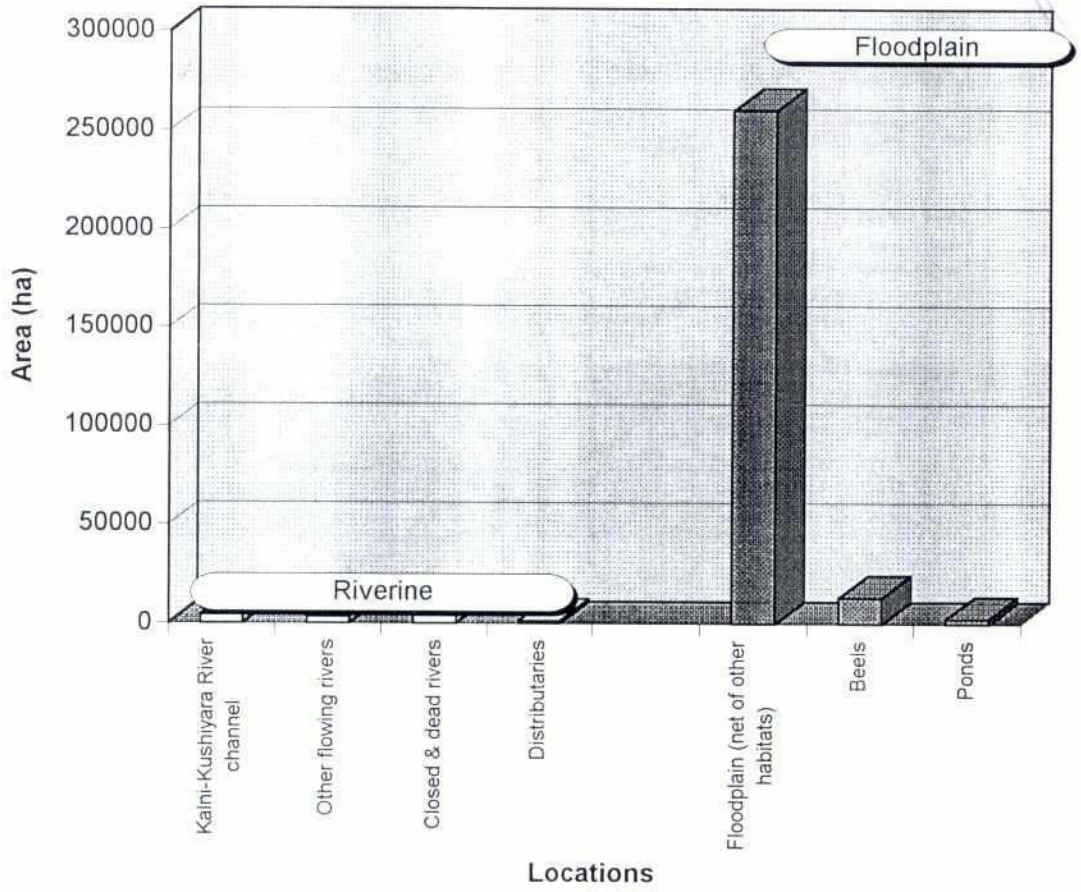
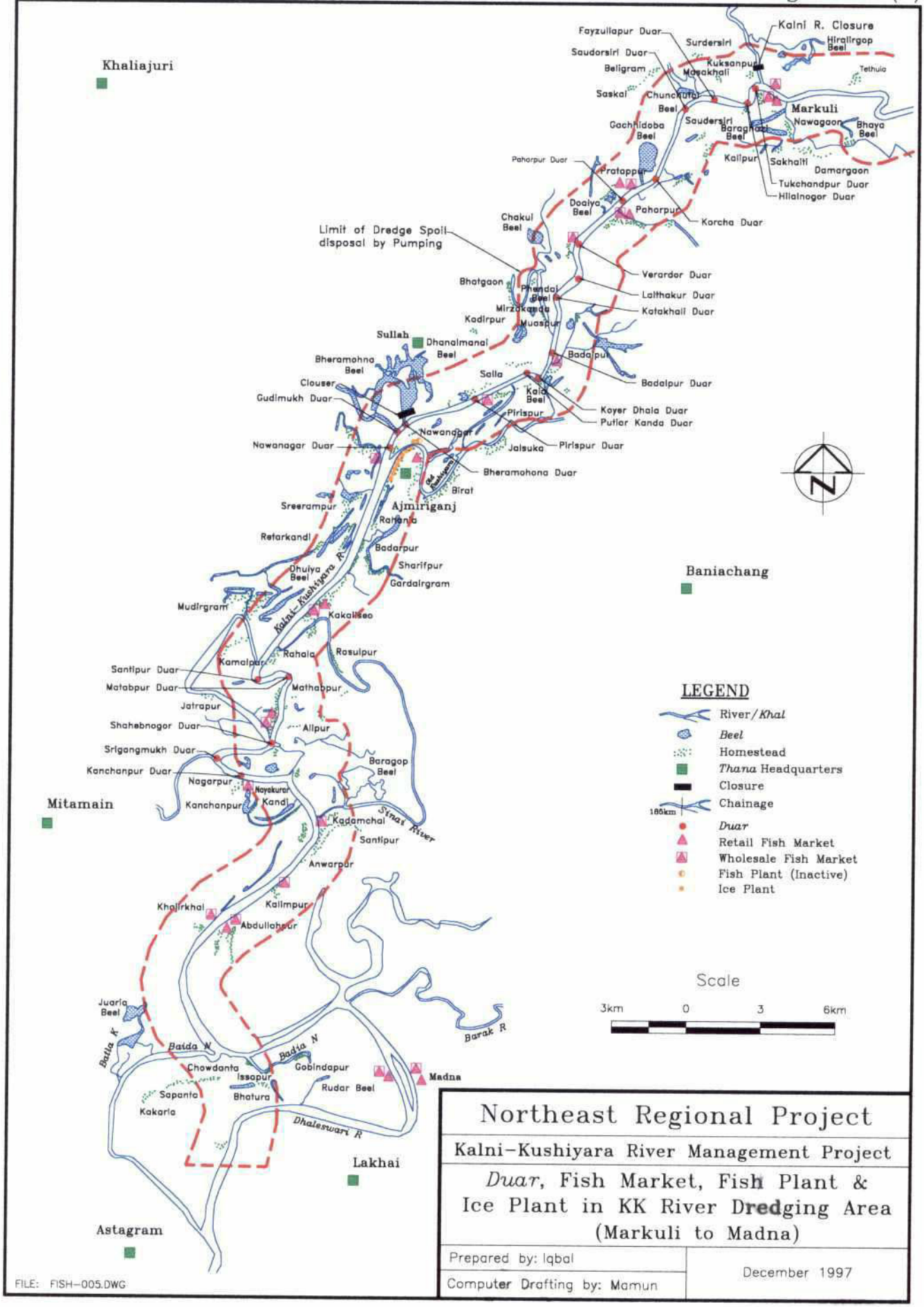


Figure H.5(a)



Northeast Regional Project

Kalni-Kushiyara River Management Project

Duar, Fish Market, Fish Plant & Ice Plant in KK River Dredging Area (Markuli to Madna)

Prepared by: Iqbal	December 1997
Computer Drafting by: Mamun	

FILE: FISH-005.DWG

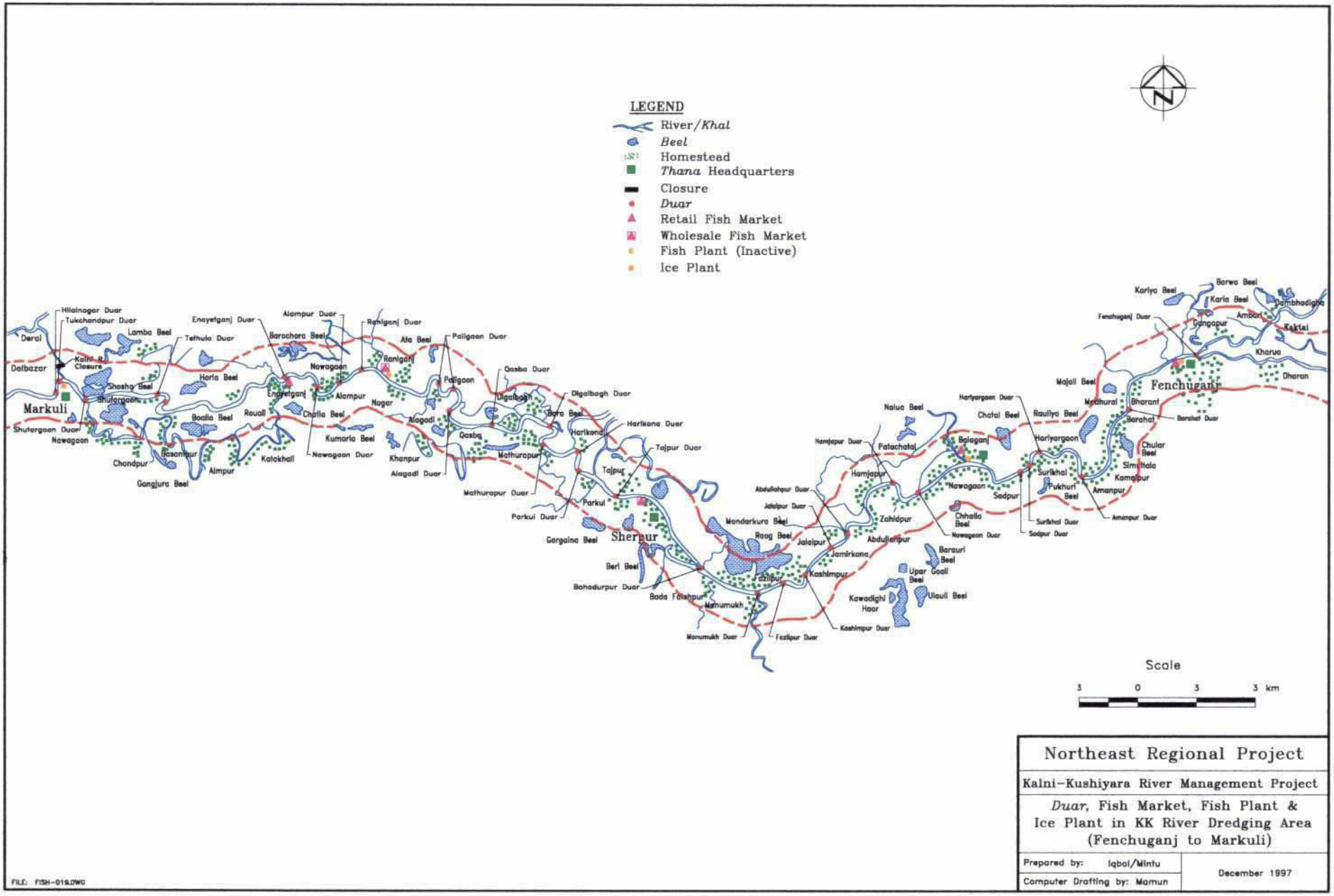

LEGEND
River/Khal
Beel
Homestead
Thana Headquarters
Closure
Duar
Retail Fish Market
Wholesale Fish Market
Fish Plant (Inactive)
Ice Plant
N
Markuli
Sherpur
Fenchuganj
Scale
3 0 3 3 km
Northeast Regional Project
Kalni-Kushiyara River Management Project
Duar, Fish Market, Fish Plant & Ice Plant in KK River Dredging Area (Fenchuganj to Markuli)
Prepared by: Iqbal/Mintu
Computer Drafting by: Mamun
December 1997
FILE: FISH-01&2.DWG

Figure H.5(b)

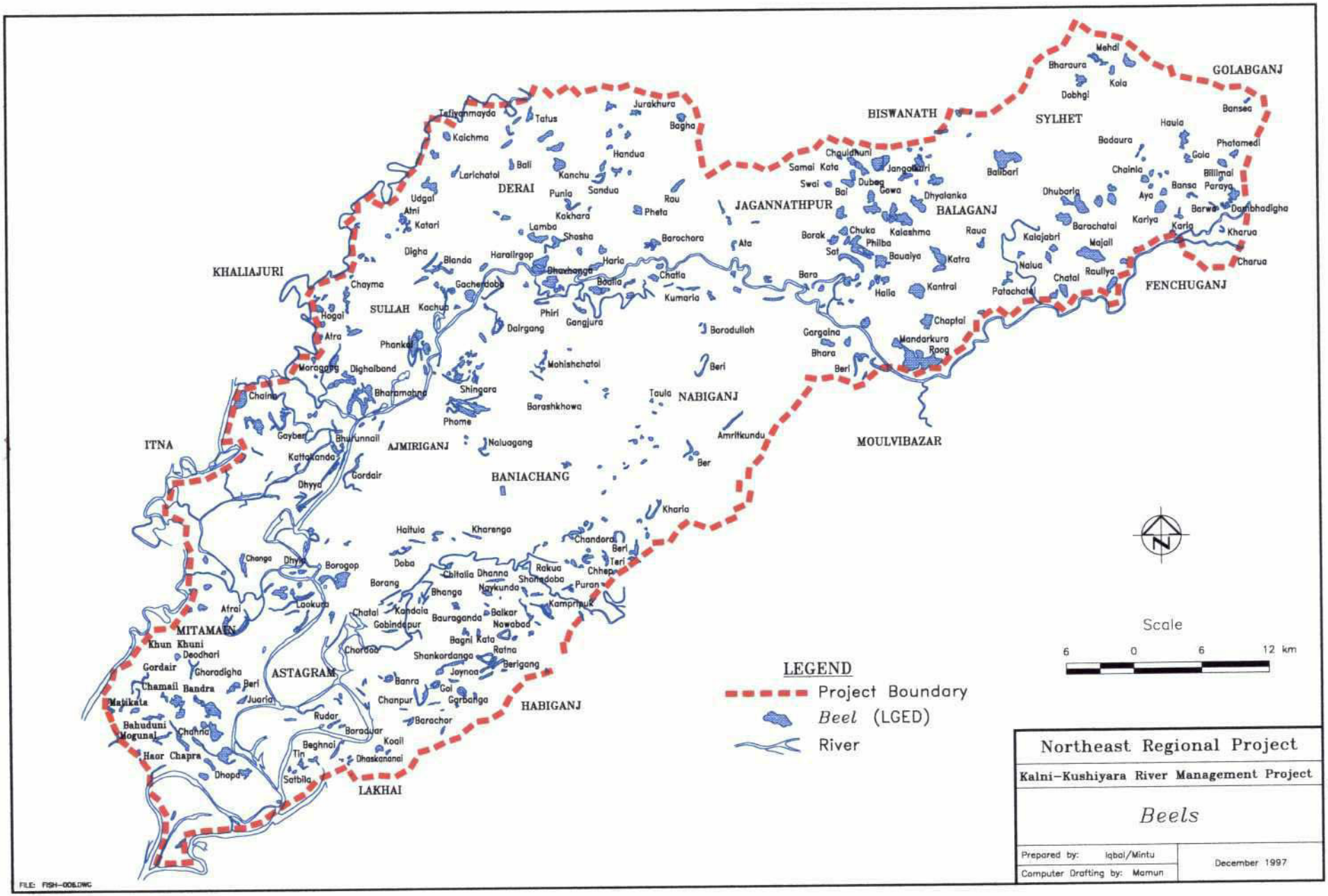
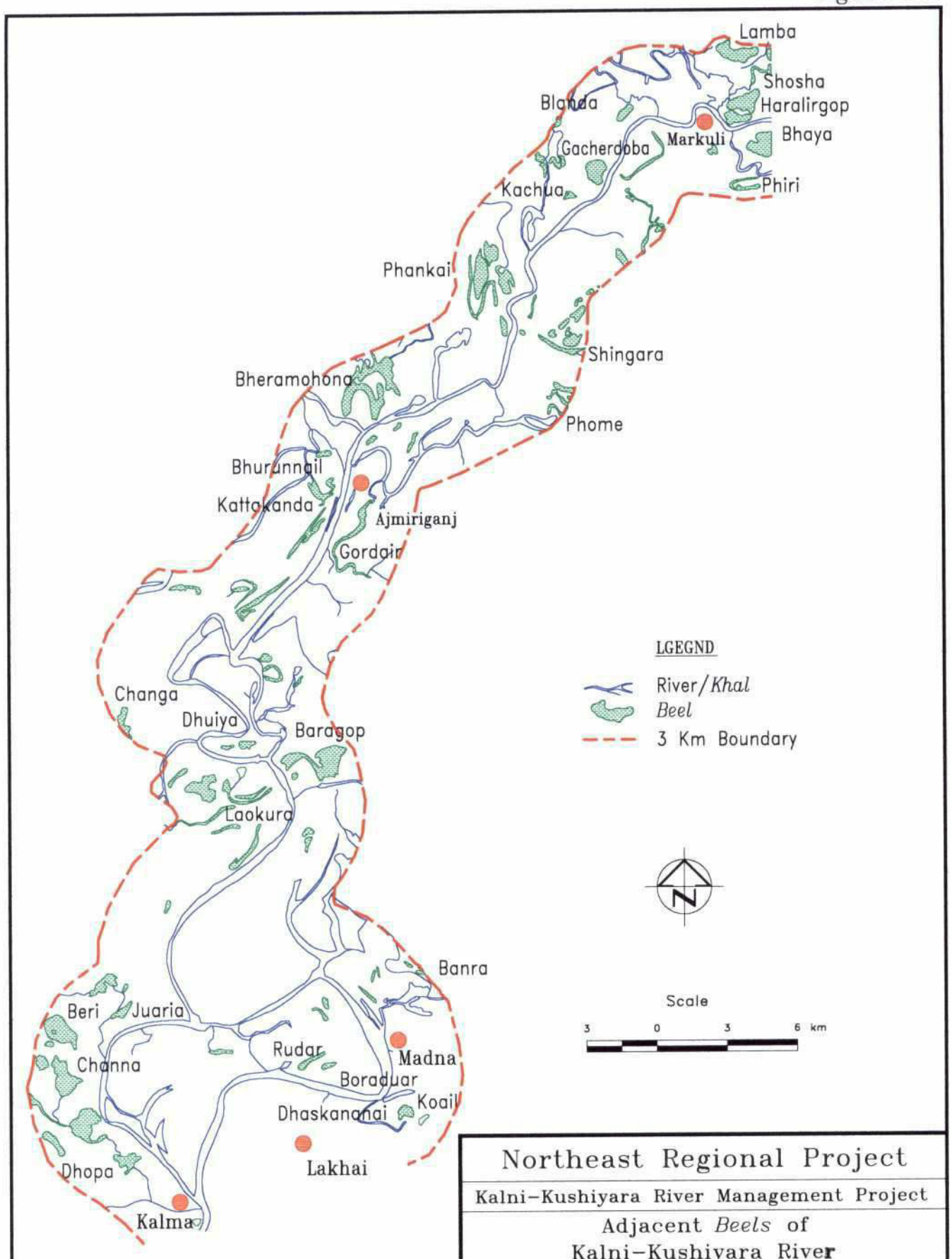

GOLABGANJ
BISWANATH
SYLHET
JAGANNATHPUR
BALAGANJ
FENCHUGANJ
KHALIAJURI
SULLAH
DERAI
NABIGANJ
BANIACHANG
AJMIRIGANJ
ITNA
MITAMAIN
ASTAGRAM
HABIGANJ
LAKHAI
MOULVIBAZAR
Mehdi
Bharaura
Kola
Dobhgi
Bansea
Badaura
Phatamedi
Gola
Chainia
Bililmai
Paraya
Bansa
Aya
Barwa
Dambhadigha
Karlya
Karia
Kharua
Charua
Barachatal
Majail
Raullya
Chatal
Nalua
Patachatal
Kalajabri
Dhuboria
Balibari
Raua
Kalashma
Chuka
Philba
Borak
Sat
Baualya
Katra
Kantral
Halla
Bara
Chaptal
Mandarkura
Raog
Gargaina
Bhara
Beri
Amritkundu
Ber
Taula
Barashkhowa
Mohishchatal
Shingara
Phome
Naluagang
Bhurunnail
Gayber
Chainia
Bharamatna
Dighalband
Moraggang
Atra
Phanka
Nagal
Chayma
Kachua
Gachendoba
Dairgang
Gangjura
Phiri
Kumaria
Chatla
Baalia
Bhachanga
Haria
Harailrgop
Barochora
Ata
Blanda
Digha
Udgal
Atni
Katari
Kakhara
Lamba
Shosha
Punia
Sandua
Rau
Pheta
Handua
Kanchu
Bali
Larichatal
Tatus
Jurakhura
Bagha
Kaichma
Tefiyanmayda
Samai
Kata
Chauidhuni
Jangaltari
Swai
Bal
Dubeg
Gowa
Dhyalanka
Kharia
Chandora
Beri
Teri
Chhep
Rakua
Shonadoba
Puran
Kampripuk
Naykunda
Bhanga
Borang
Chitalia
Dhanna
Kharenga
Haitula
Doba
Borogop
Dhyia
Chonga
Laokura
Atrai
Chatal
Kandala
Gobindapur
Bauraganda
Balkar
Nowabad
Bagni
Kata
Ratna
Shankordanga
Joynoa
Berigang
Chordoa
Banra
Gol
Garbanga
Chanpur
Barachor
Rudar
Baraduar
Koail
Dhaskananai
Beghnai
Tin
Satbila
Dhopd-i
Haor
Chapra
Bahuduni
Mogunal
Chahnia
Matikata
Juaria
Beri
Bandra
Chamail
Gordair
Ghoradigha
Khun
Khuni
Deodhari
Gordair
Dhyya
Kattakanda
Gayber
Bhurunnail
Chainia
Moraggang
Dighalband
Atra
Phanka
Nagal
Chayma
Kachua
Gachendoba
Dairgang
Gangjura
Phiri
Kumaria
Chatla
Baalia
Bhachanga
Haria
Harailrgop
Barochora
Ata
Blanda
Digha
Udgal
Atni
Katari
Kakhara
Lamba
Shosha
Punia
Sandua
Rau
Pheta
Handua
Kanchu
Bali
Larichatal
Tatus
Jurakhura
Bagha
Kaichma
Tefiyanmayda
Scale
6 0 6 12 km
LEGEND
Project Boundary
Beel (LGED)
River
Northeast Regional Project
Kalni-Kushiyara River Management Project
Beels
Prepared by: Iqbal/Mintu
Computer Drafting by: Mamun
December 1997
FILE: FISH-005.DWG

Figure H.6

Figure H.7



Northeast Regional Project	
Kalni–Kushiyara River Management Project	
Adjacent *Beels* of Kalni–Kushiyara River (Markuli to Kalma)	
Prepared by: Iqbal/Mintu	December 1997
Computer Drafting by: Mamun	

FILE: FISH–007.DWG

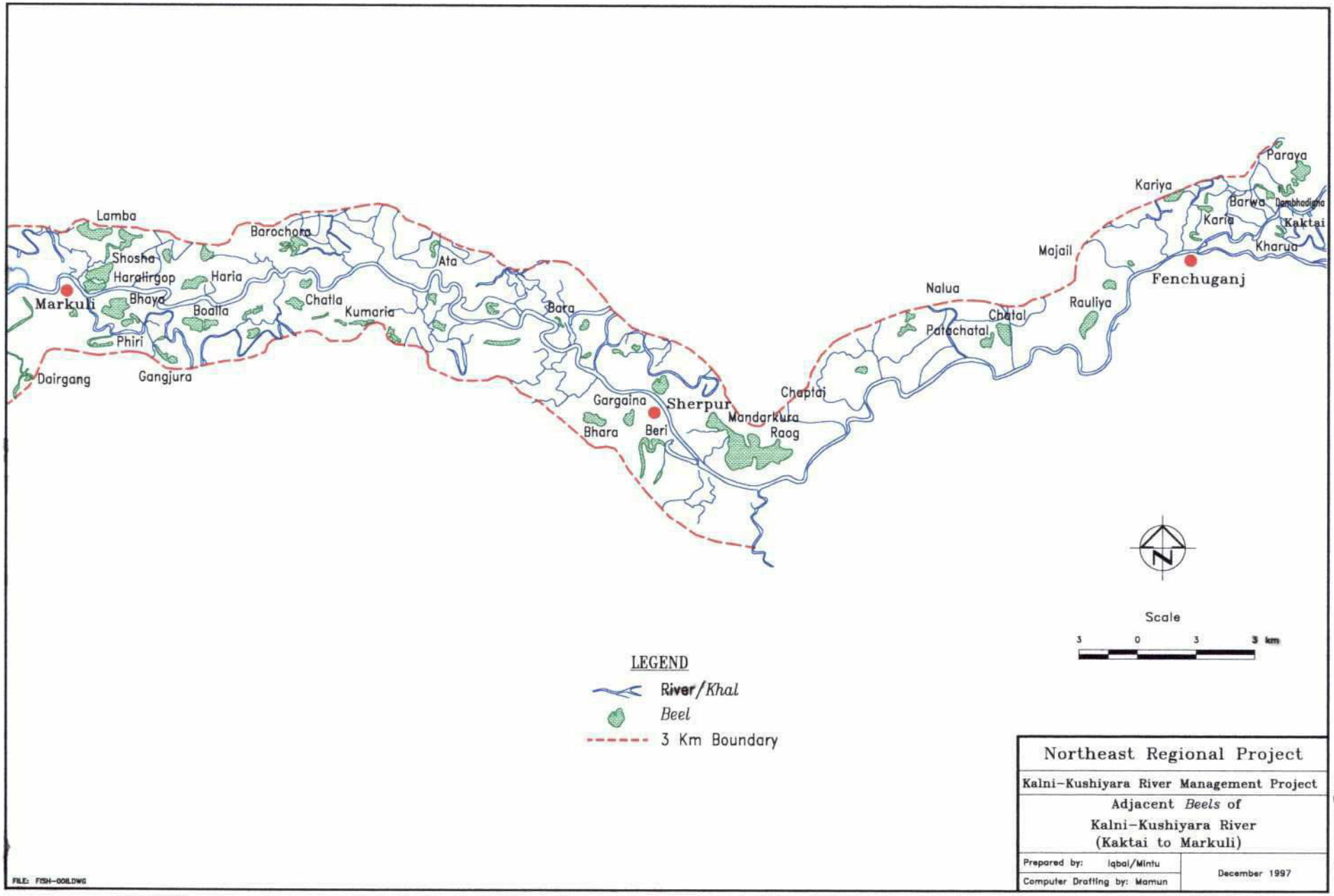

Lamba
Barochora
Shosha
Haralirgop
Haria
Markuli
Bhaya
Boalia
Chatla
Kumaria
Ata
Bara
Phiri
Dairgang
Gangjura
Gargaina
Sherpur
Bhara
Beri
Mandarkura
Raog
Chaptai
Nalua
Patechatal
Chatal
Majail
Rauliya
Kariya
Paraya
Barwa
Dambhadigha
Karia
Kaktai
Kharua
Fenchuganj
N
Scale
3 0 3 3 km
LEGEND
River/Khal
Beel
3 Km Boundary
Northeast Regional Project
Kalni-Kushiyara River Management Project
Adjacent Beels of
Kalni-Kushiyara River
(Kaktai to Markuli)
Prepared by: Iqbal/Mintu
Computer Drafting by: Mamun
December 1997
FILE: FISH-008.DWG

Figure H.8

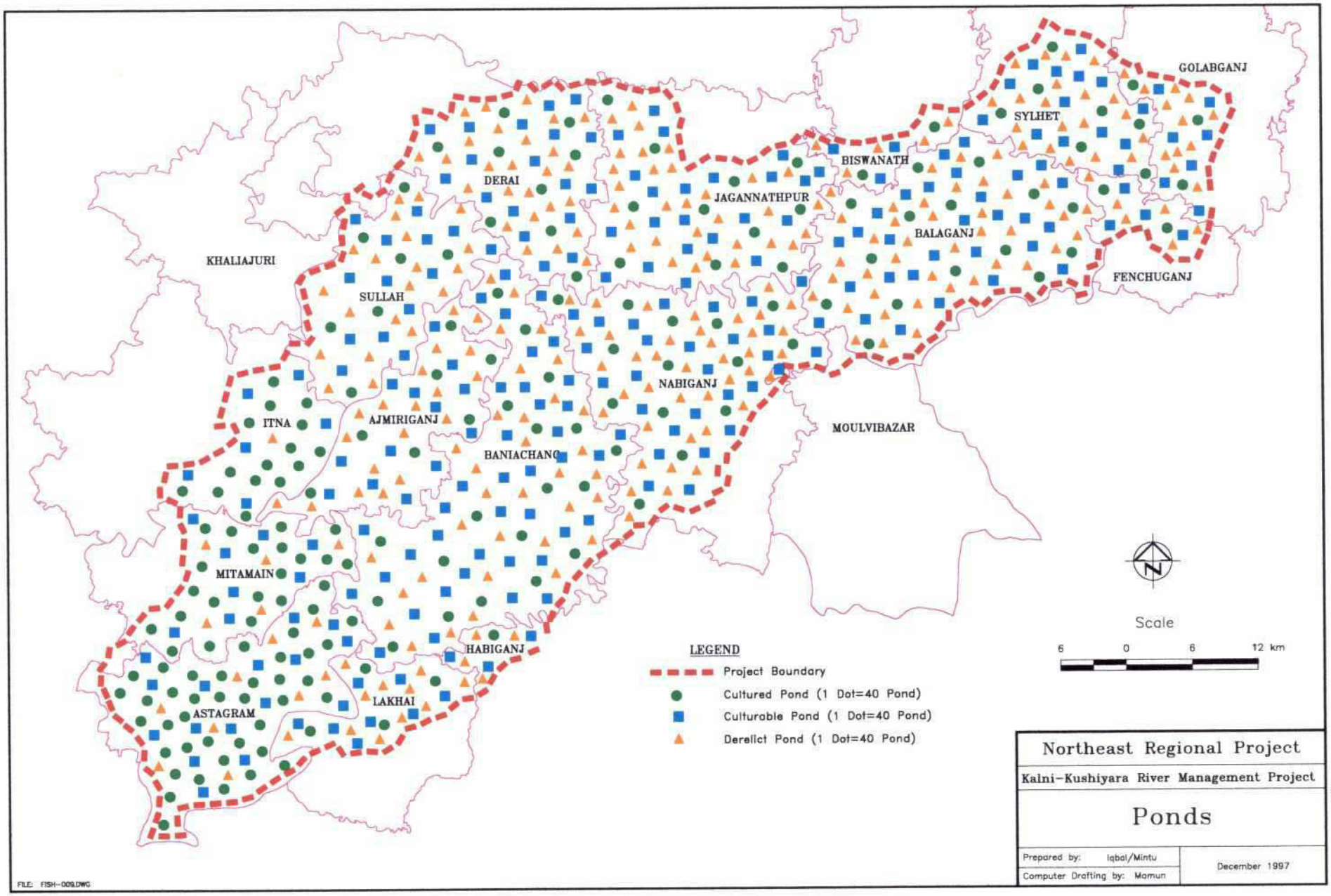

GOLABGANJ
SYLHET
BISWANATH
DERAI
JAGANNATHPUR
BALAGANJ
KHALIAJURI
FENCHUGANJ
SULLAH
NABIGANJ
ITNA
AJMIRIGANJ
MOULVIBAZAR
BANIACHANG
MITAMAIN
HABIGANJ
LAKHAI
ASTAGRAM
N
Scale
6 0 6 12 km
LEGEND
Project Boundary
Cultured Pond (1 Dot=40 Pond)
Culturable Pond (1 Dot=40 Pond)
Derelict Pond (1 Dot=40 Pond)
Northeast Regional Project
Kalni-Kushiyara River Management Project
Ponds
Prepared by: Iqbal/Mintu
Computer Drafting by: Mamun
December 1997
FILE: FISH-009.DWG

Figure H.9

Figure H.10 Annual Total Catch of the Upper Meghna River

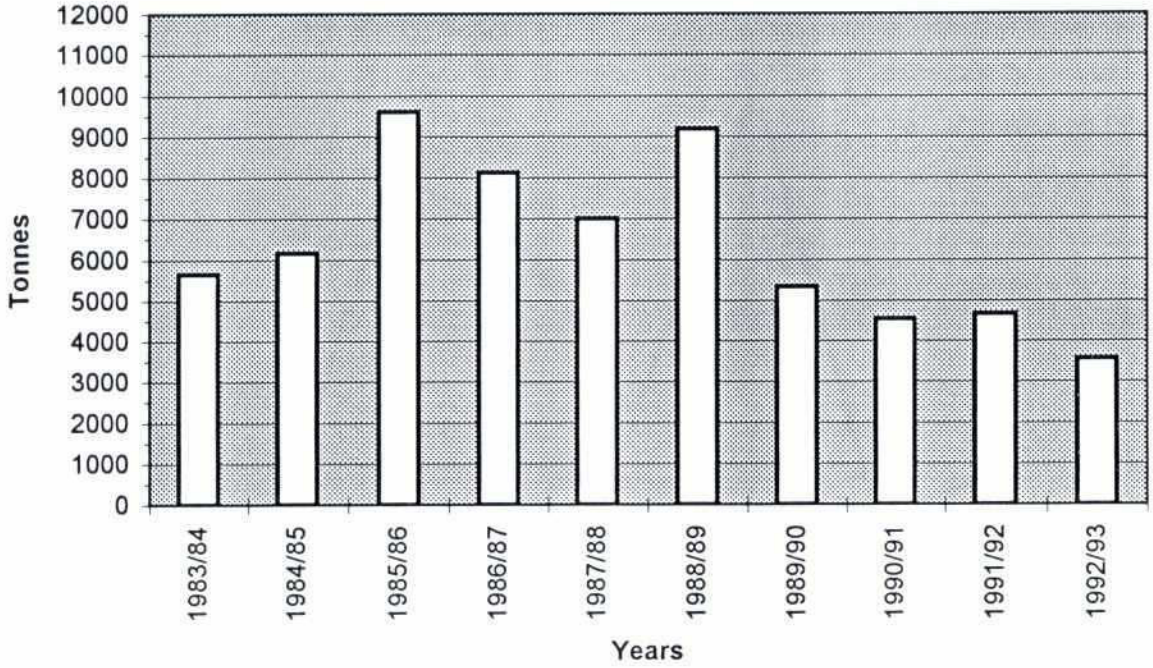


Figure H.11 Catch of the Upper Meghna River by District

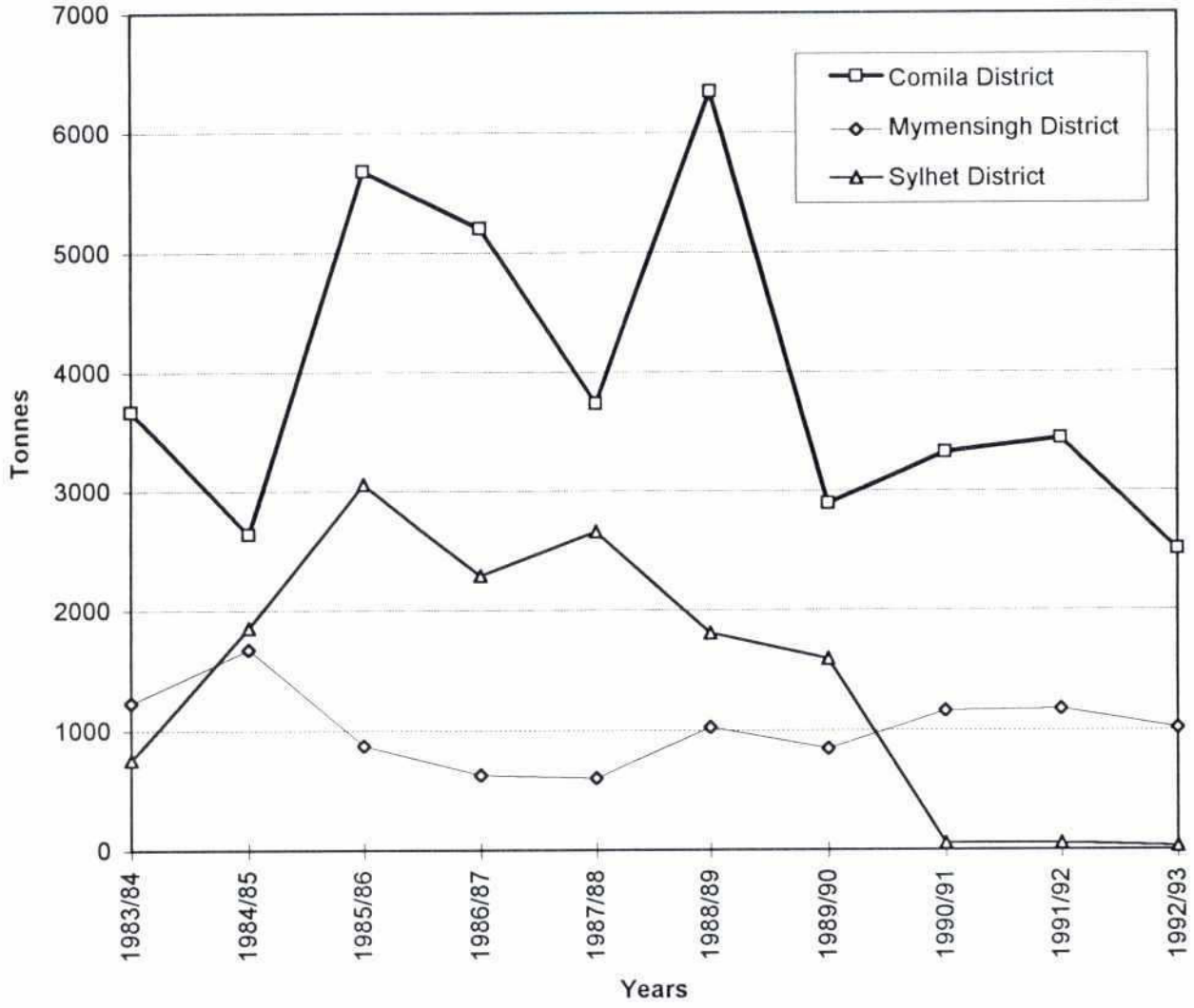


Figure H.12 Production of Carp And Catfish of the Upper Meghna River

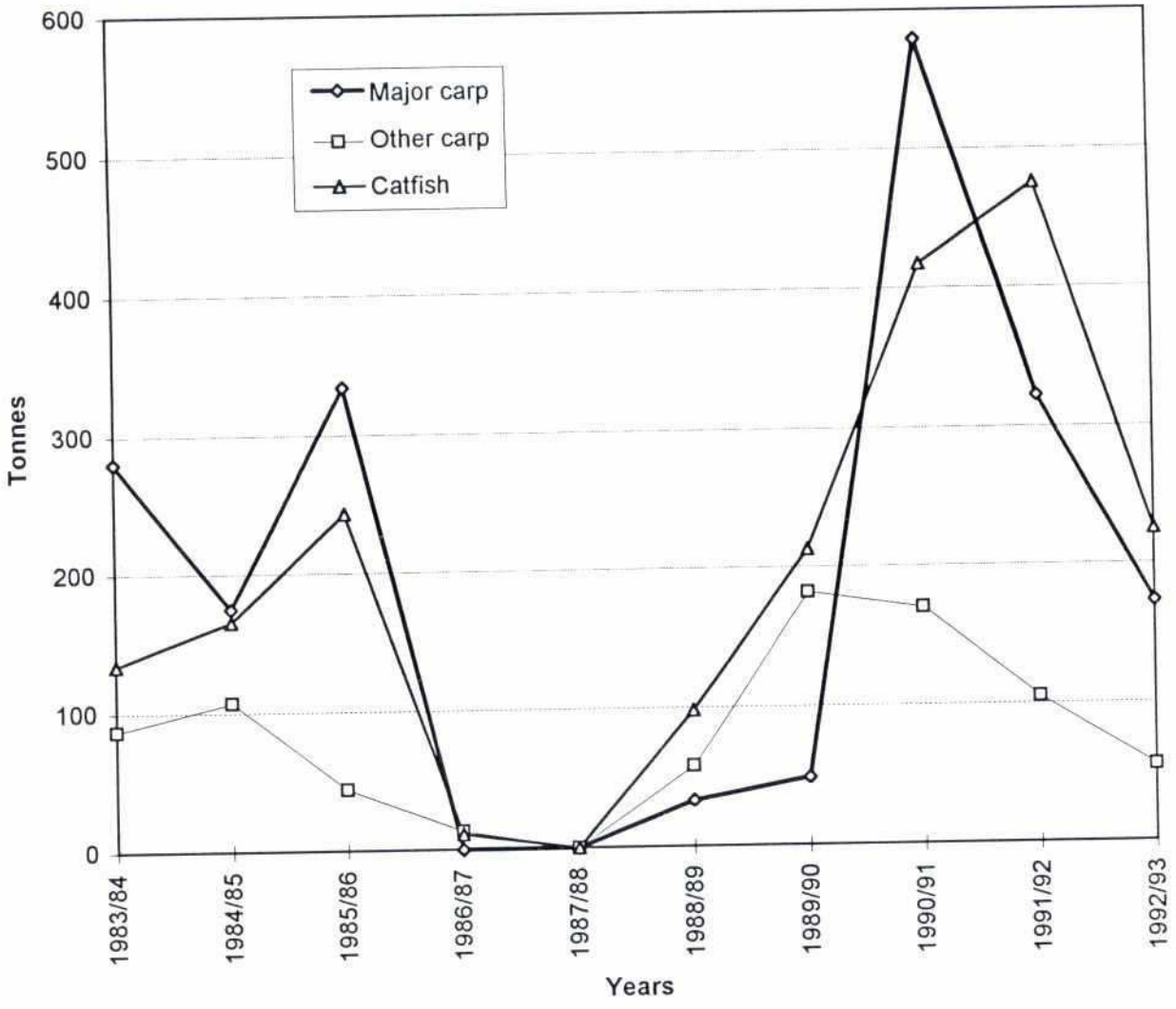


Figure H.13 Production of *Ilish* of the Upper Meghna River

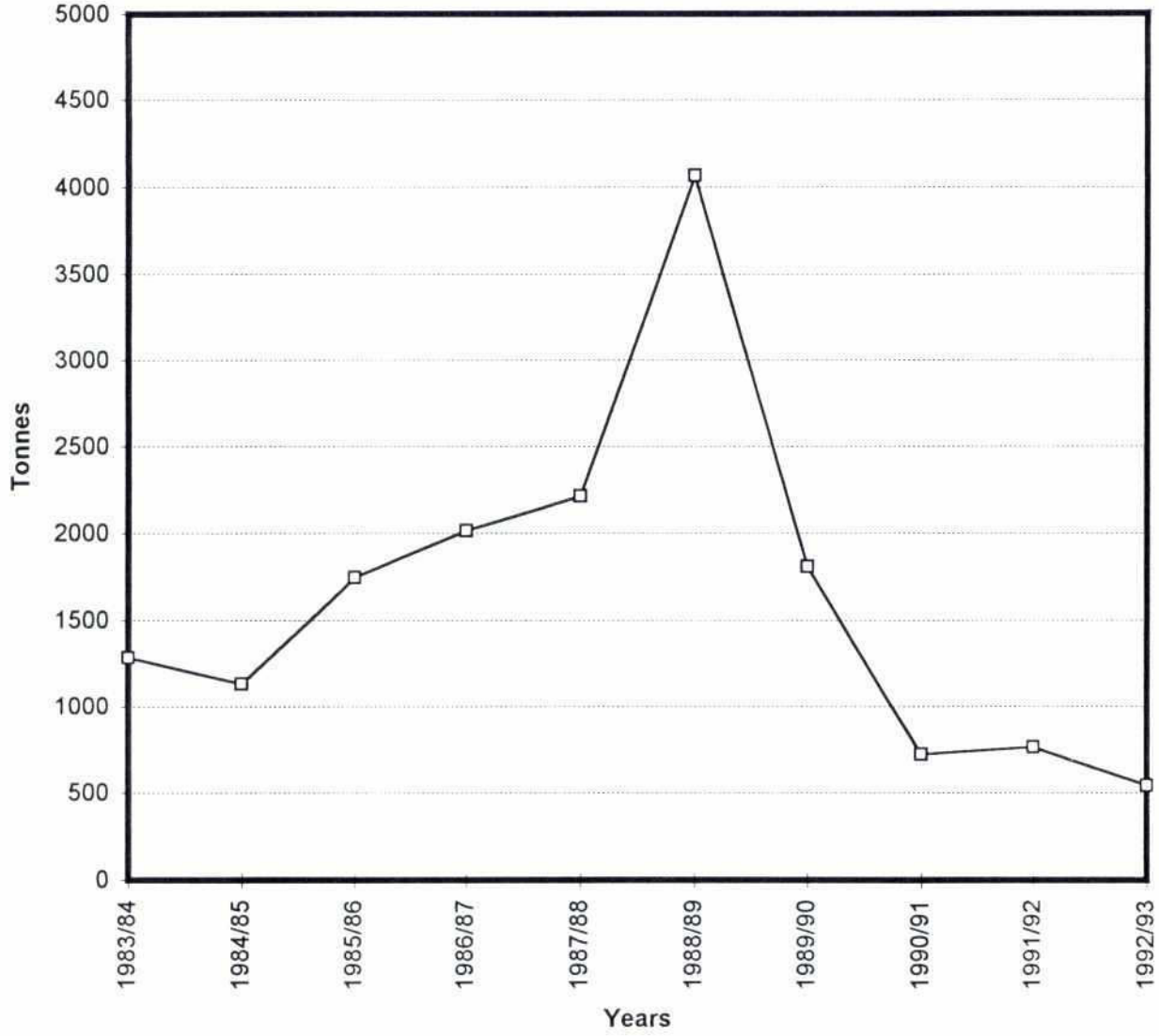


Figure H.14 Production of *Golda Chingri* of the Upper Meghna River

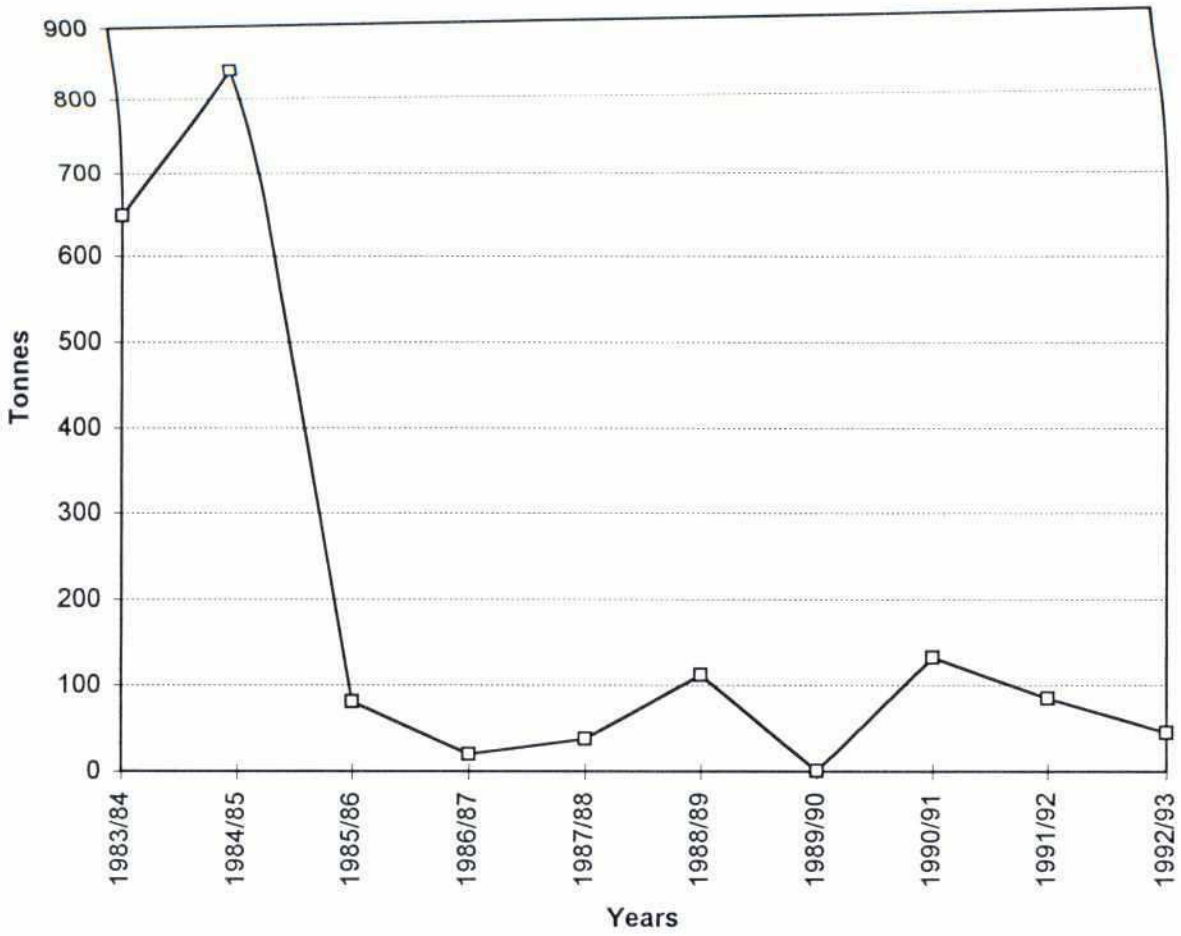


Figure H.15 Annual Purchases of Finfish and *Golda Chingri* by Ajmiriganj Fish Industries

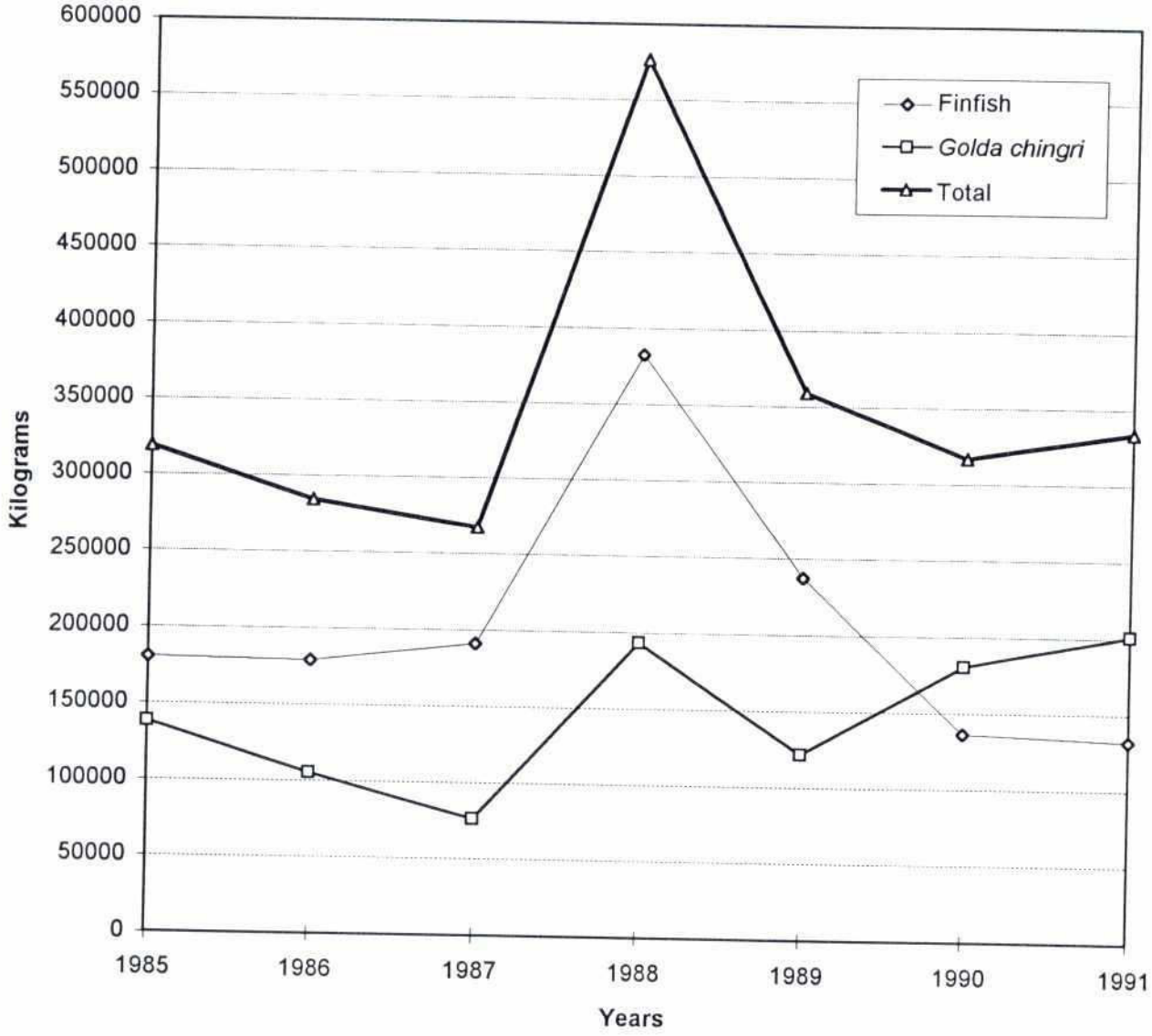


Figure H.16 Annual Purchases of Large & Small Finfish by Ajmiriganj Fish Industries

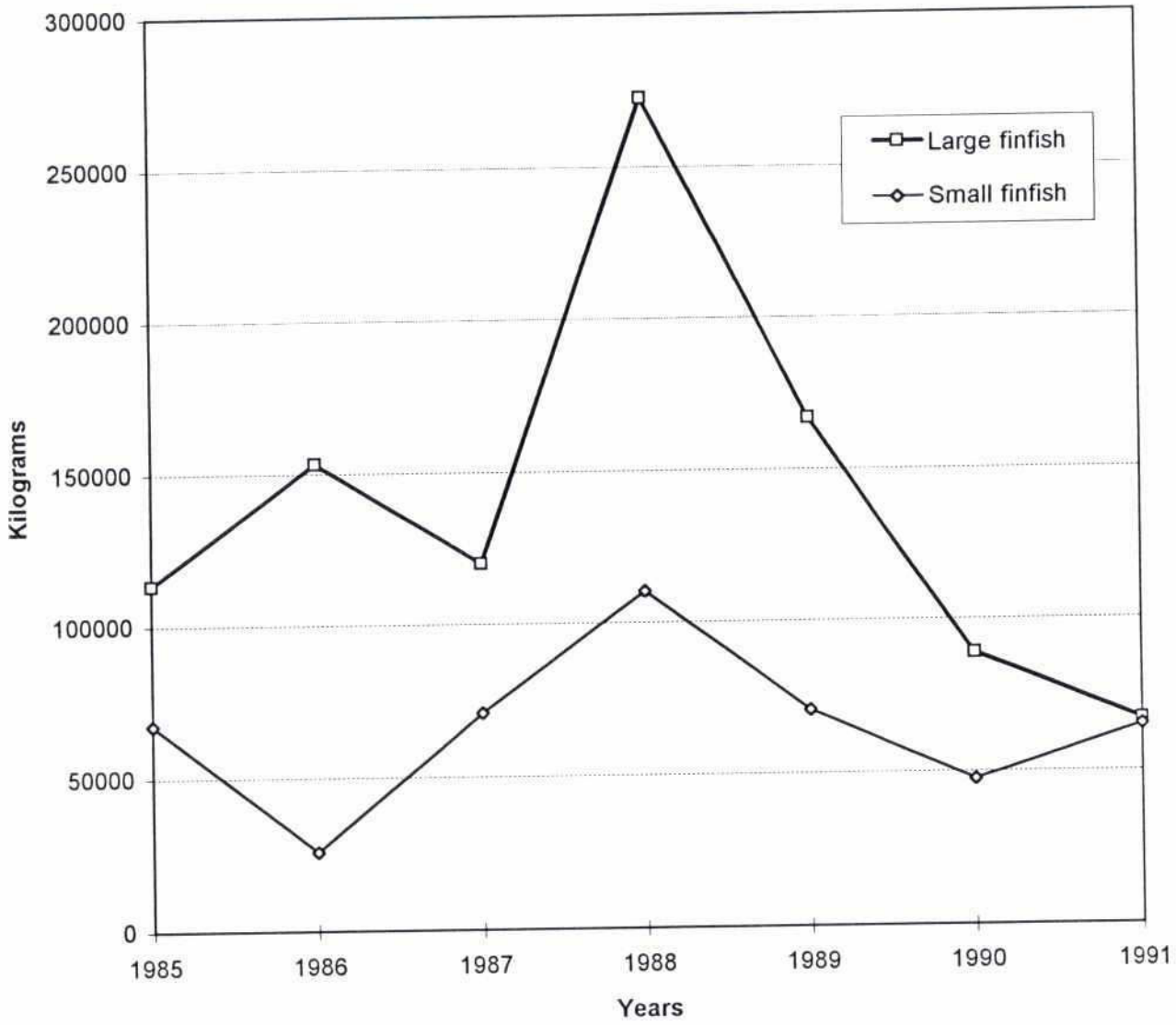


Figure H.17 Annual Purchases of Finfish (Main Groups) by Ajmiriganj Fish Industries

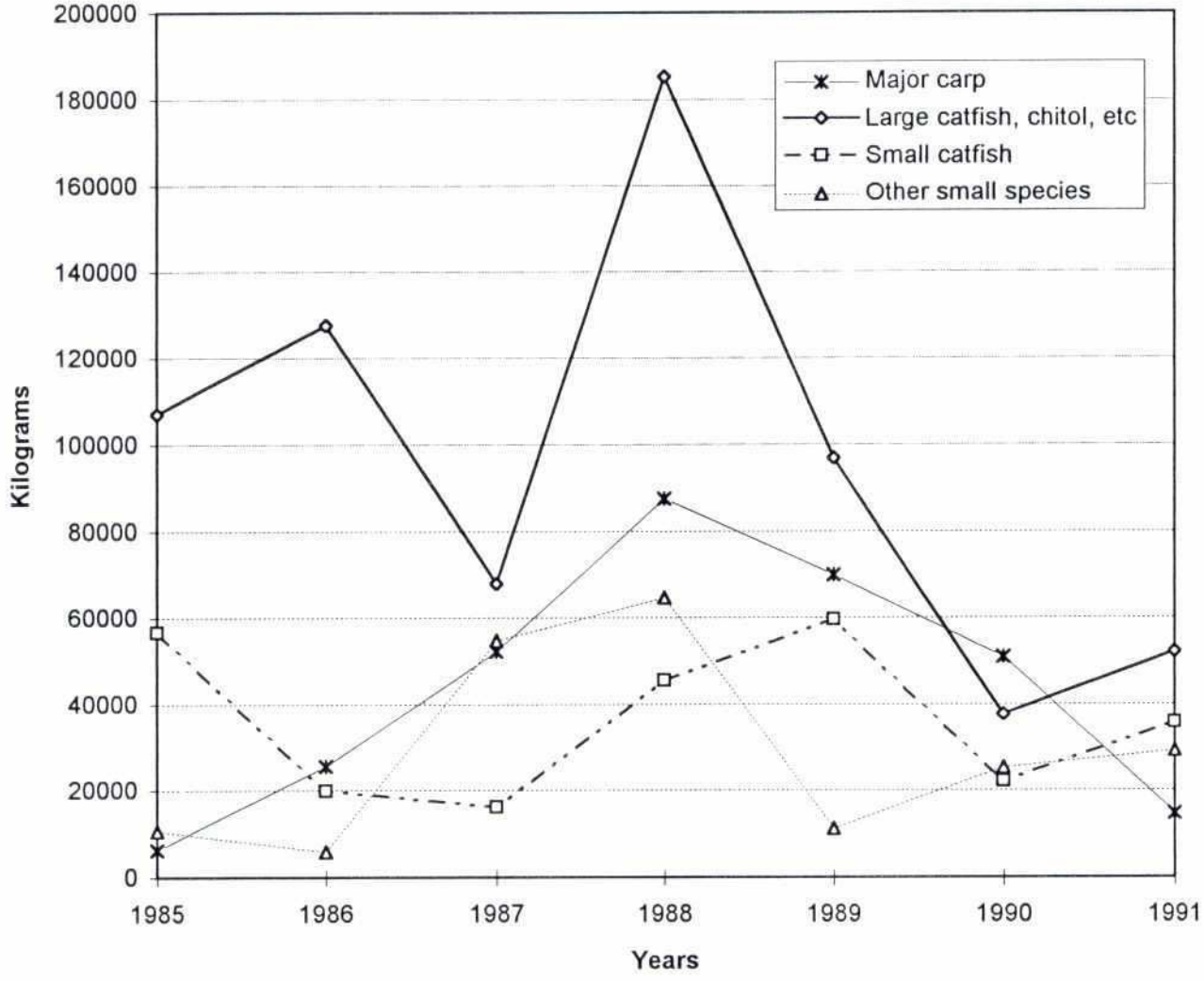


Figure H.18 Annual Purchases of Major Carp by Ajmiriganj Fish Industries

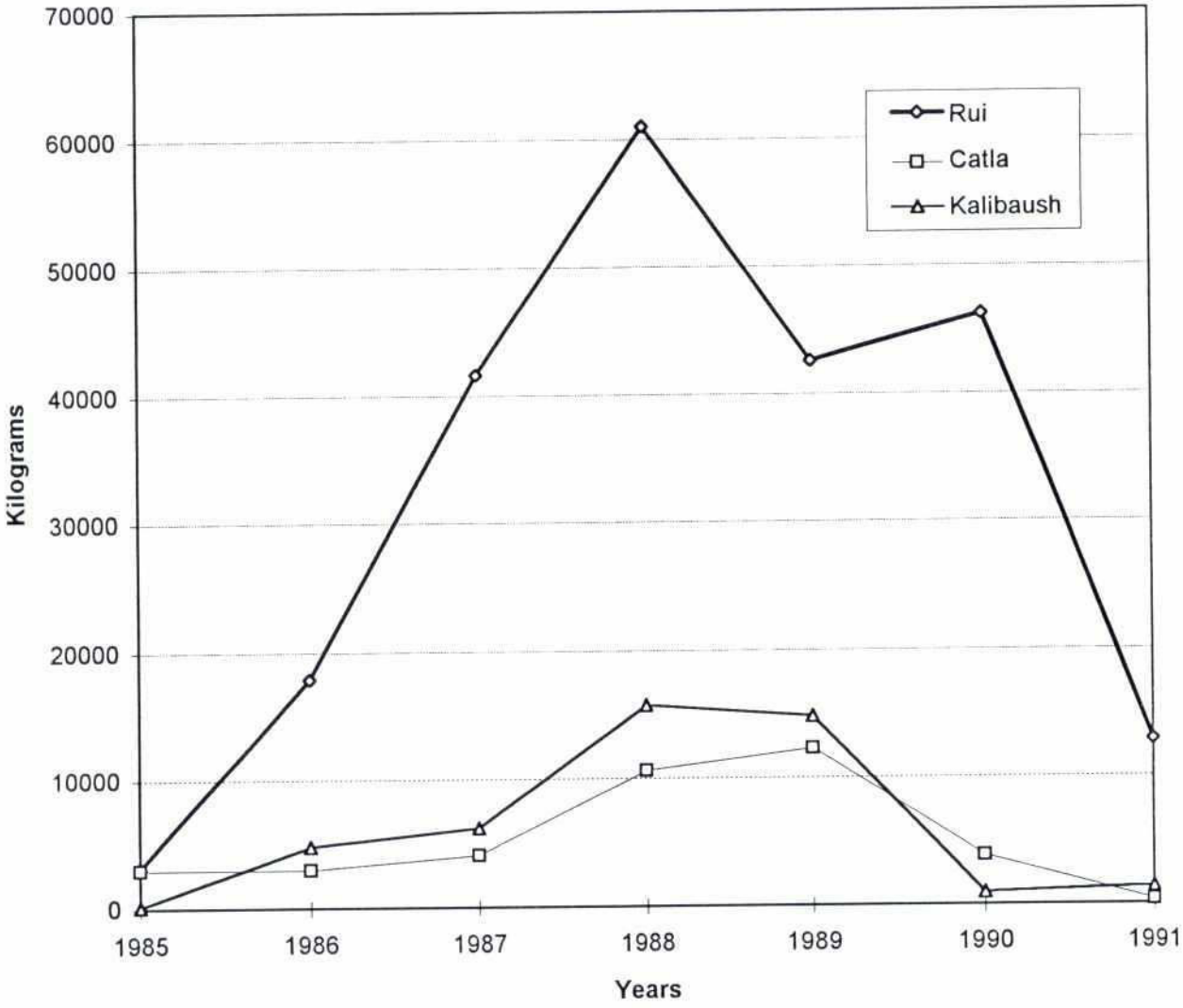


Figure H.19 Annual Purchases of Large Catfish and *Chitol* by Ajmiriganj Fish Industries

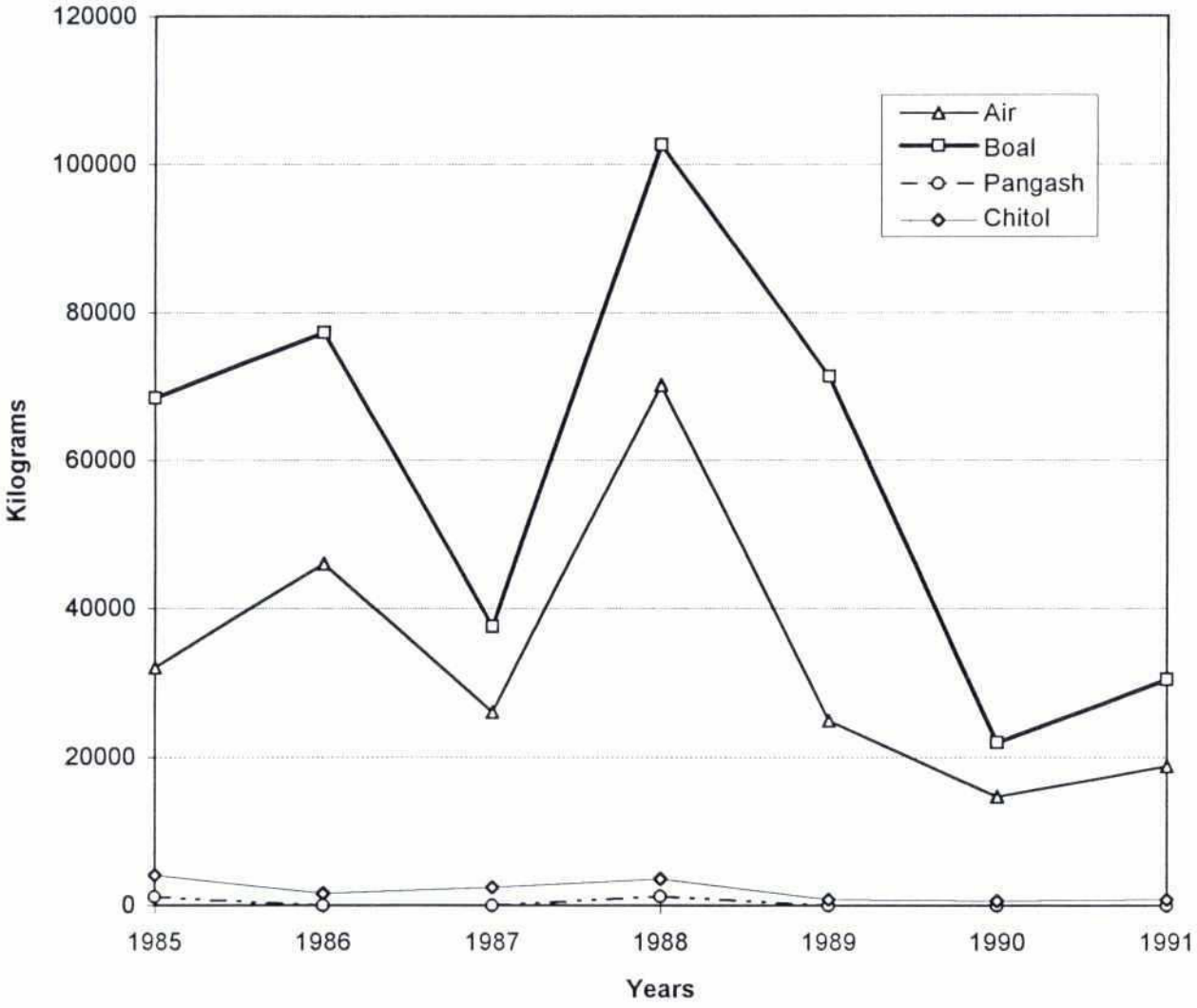


Figure H.20 Annual Purchases of Small Catfish by Ajmiriganj Fish Industries

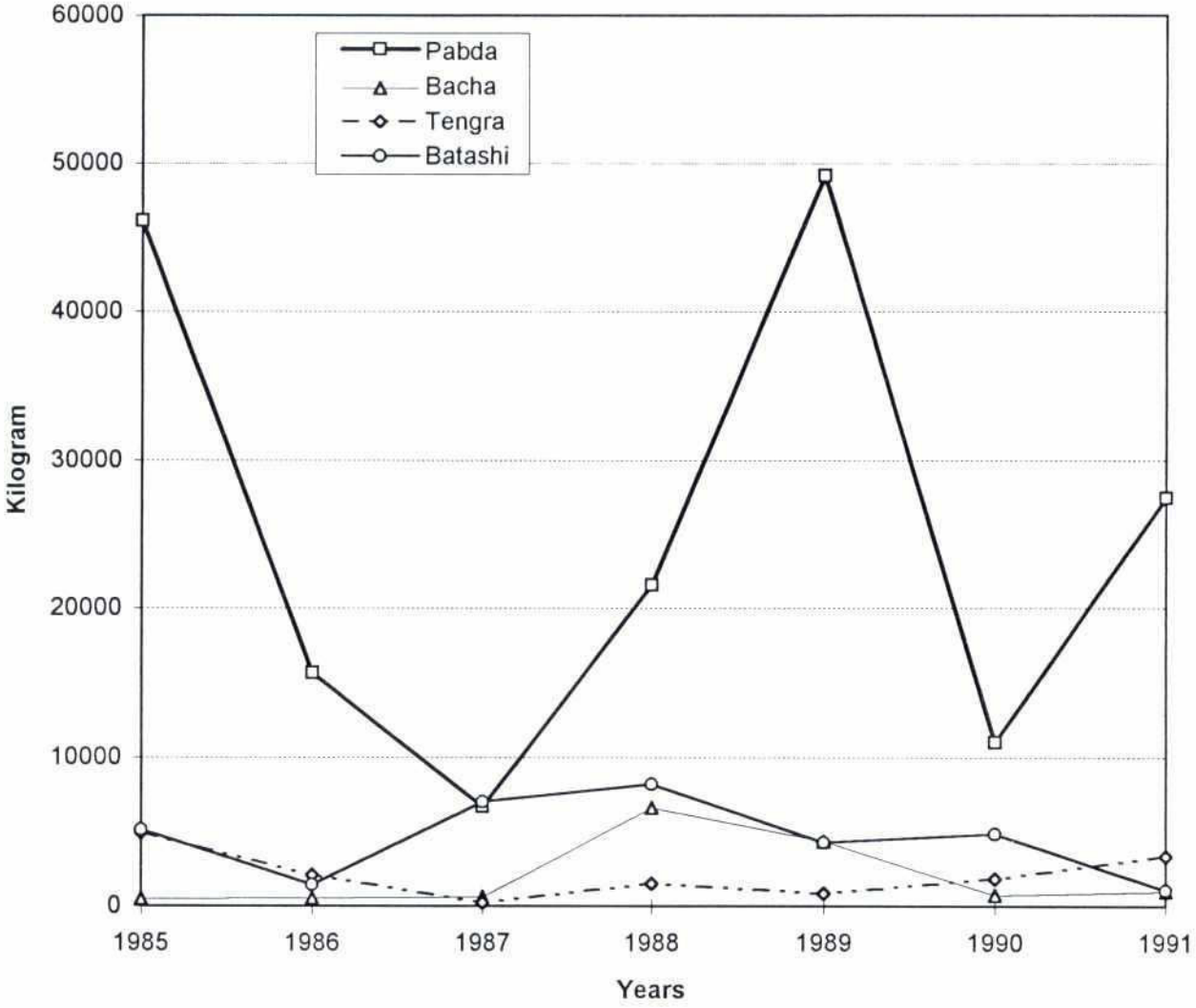


Figure H.21 Annual Purchases of Other Small Species by Ajmiriganj Fish Industries

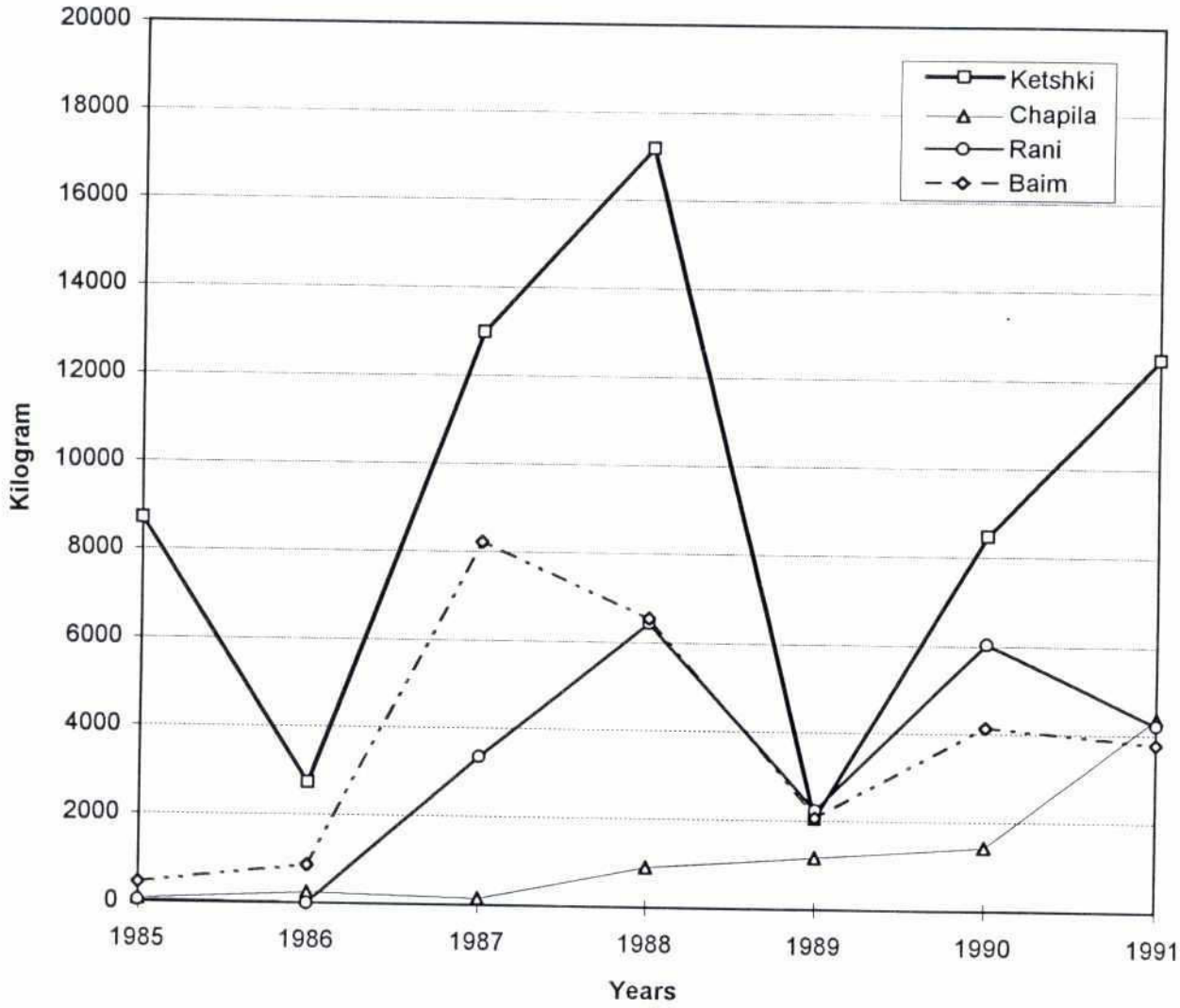


Figure H.22 Annual Export of Fishery Products by Ajmiriganj Fish Industries

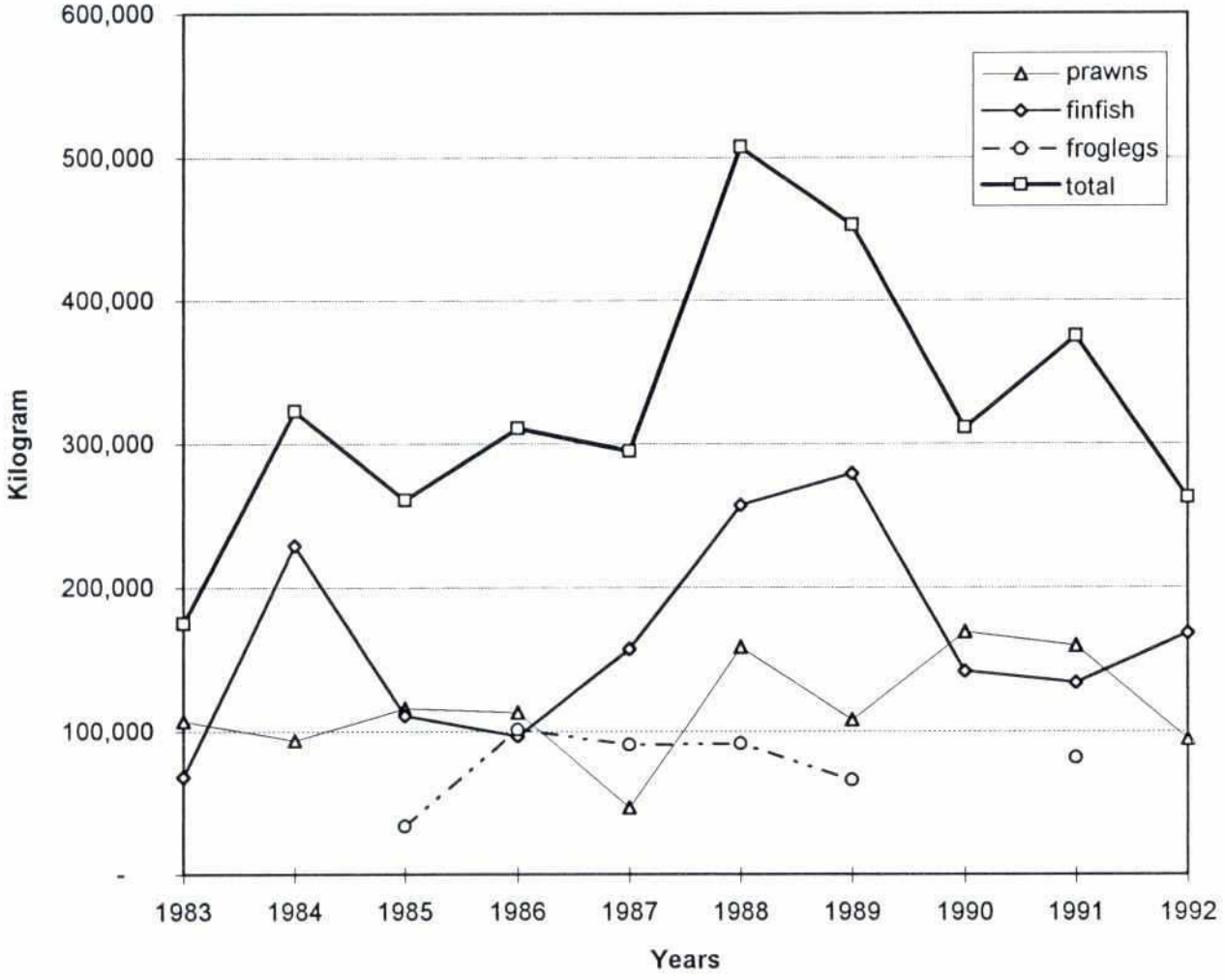


Figure H.23 Quantity of Fishery Products Exported Annually by Kuliarchar Cold Storage Ltd.

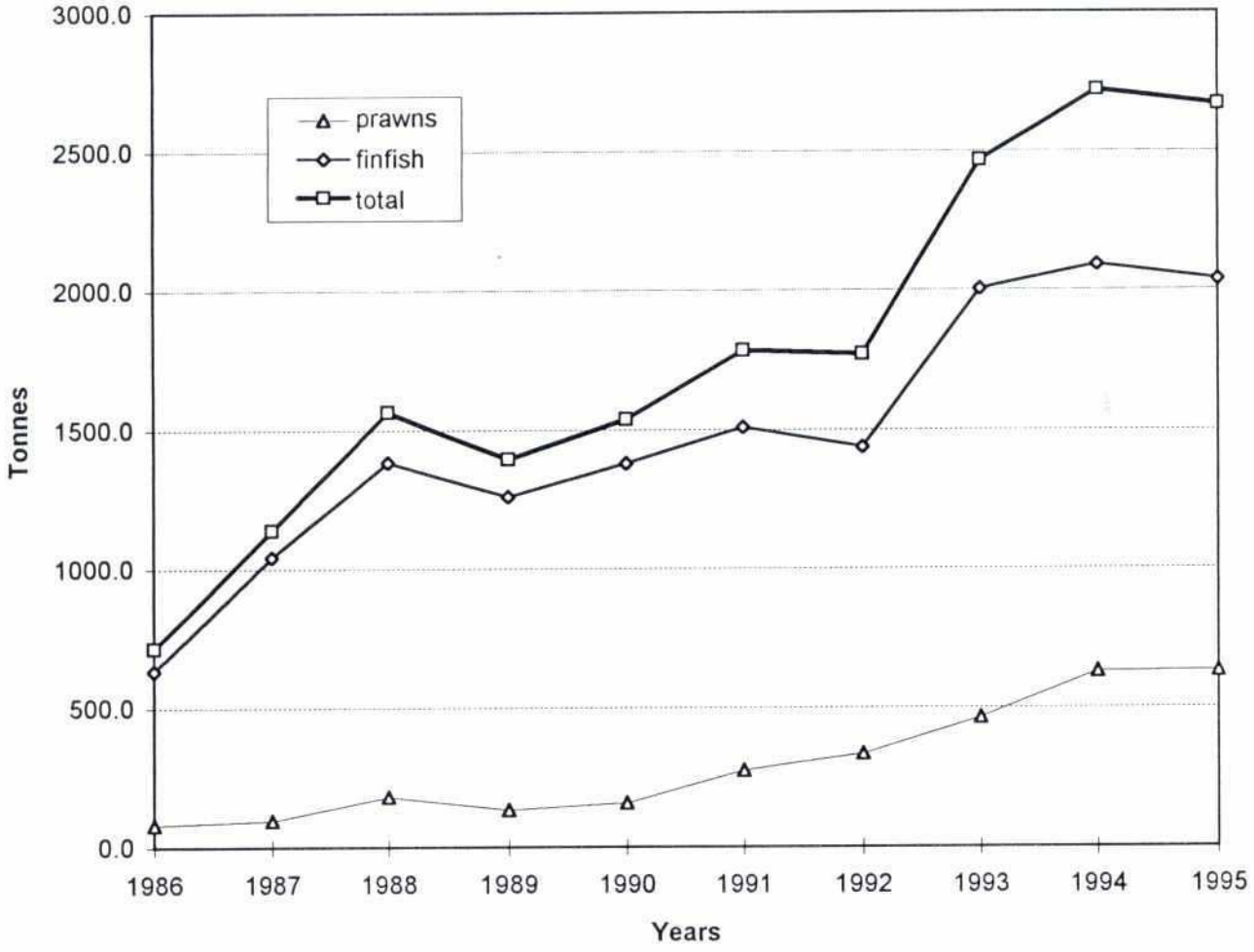


Figure H.24 Monthly Standing Crop Index of Kushiyara River (107)

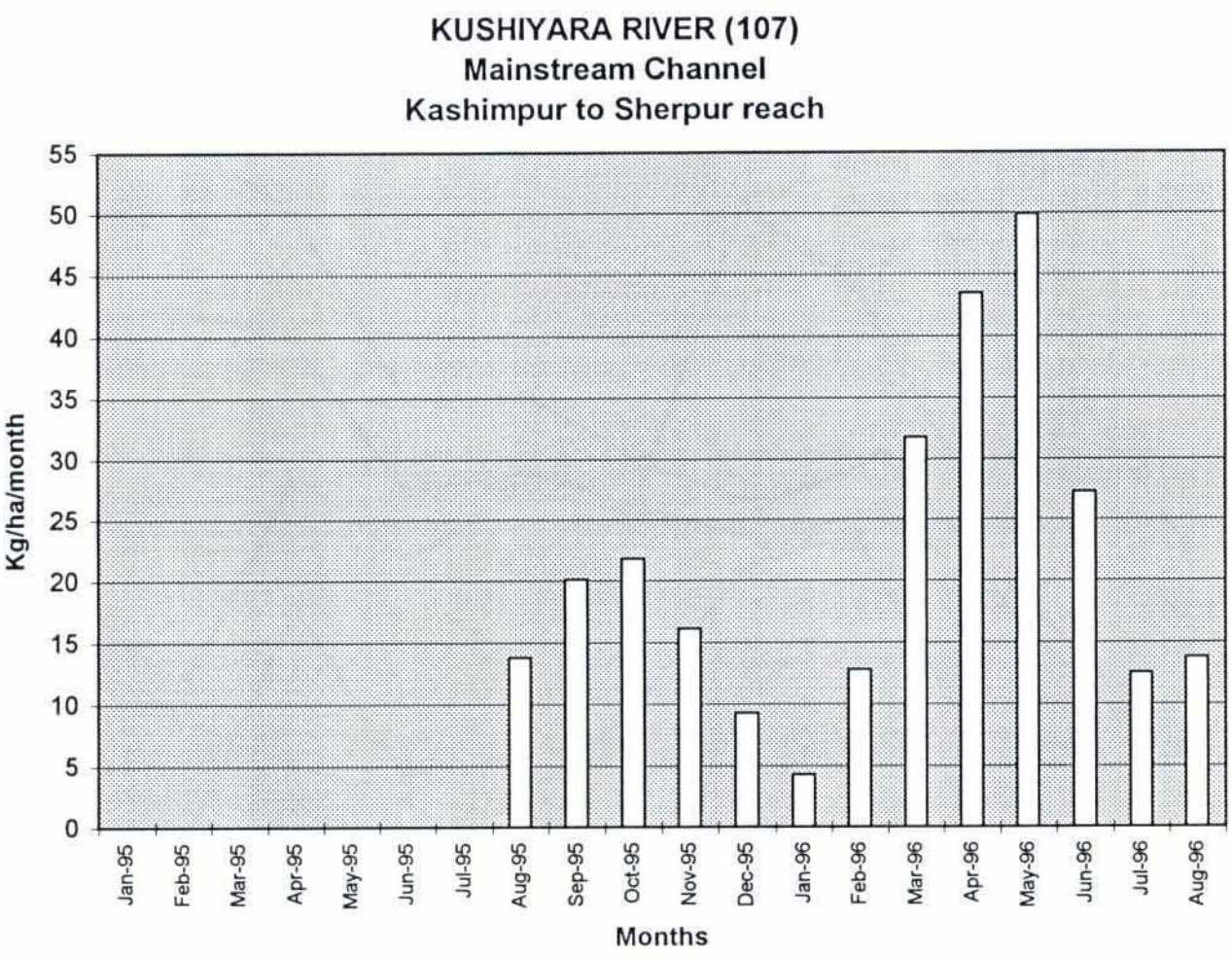


Figure H.25 Monthly Standing Crop Index of Kalni River (100)

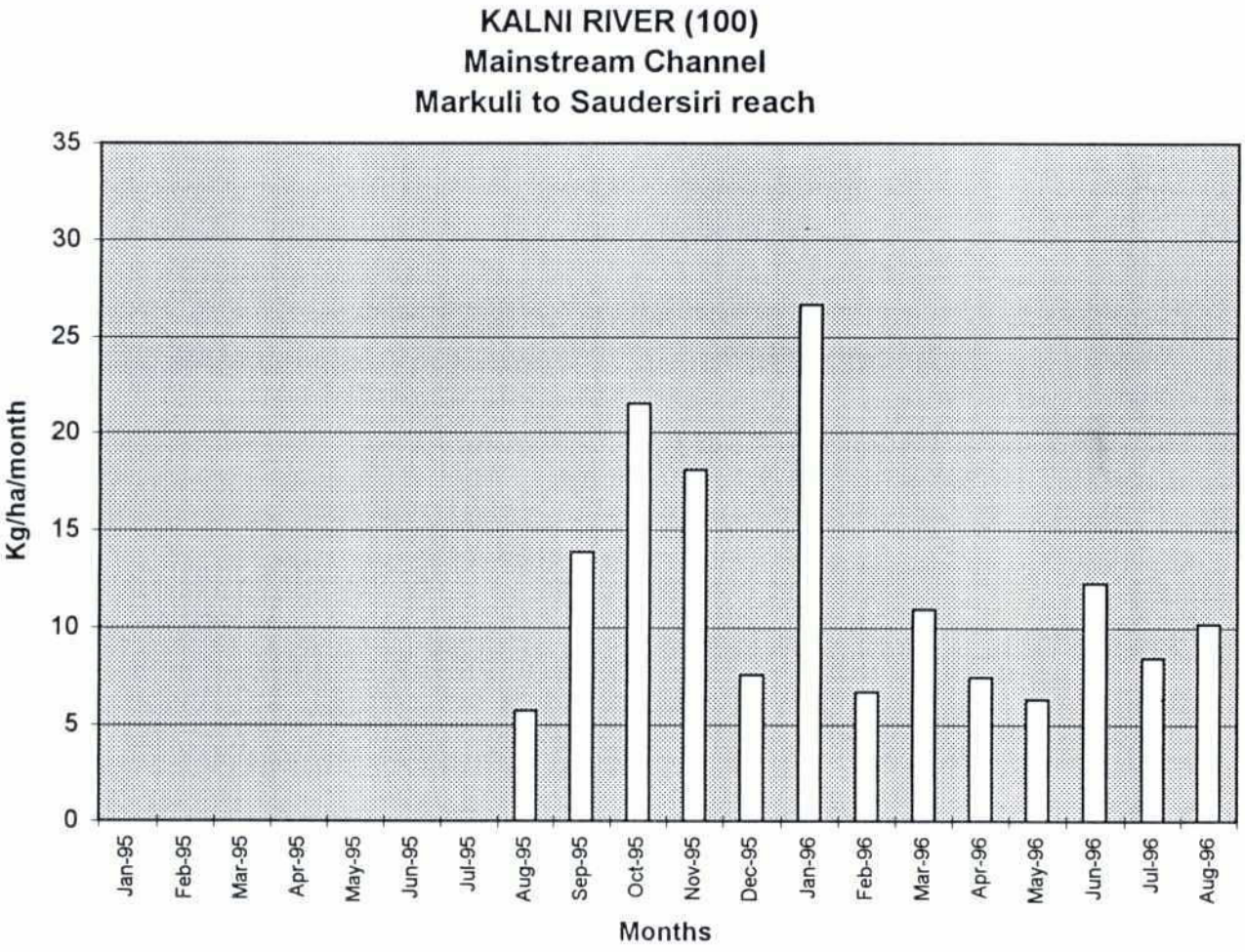


Figure H.26 Monthly Standing Crop Index of Kalni River (101)

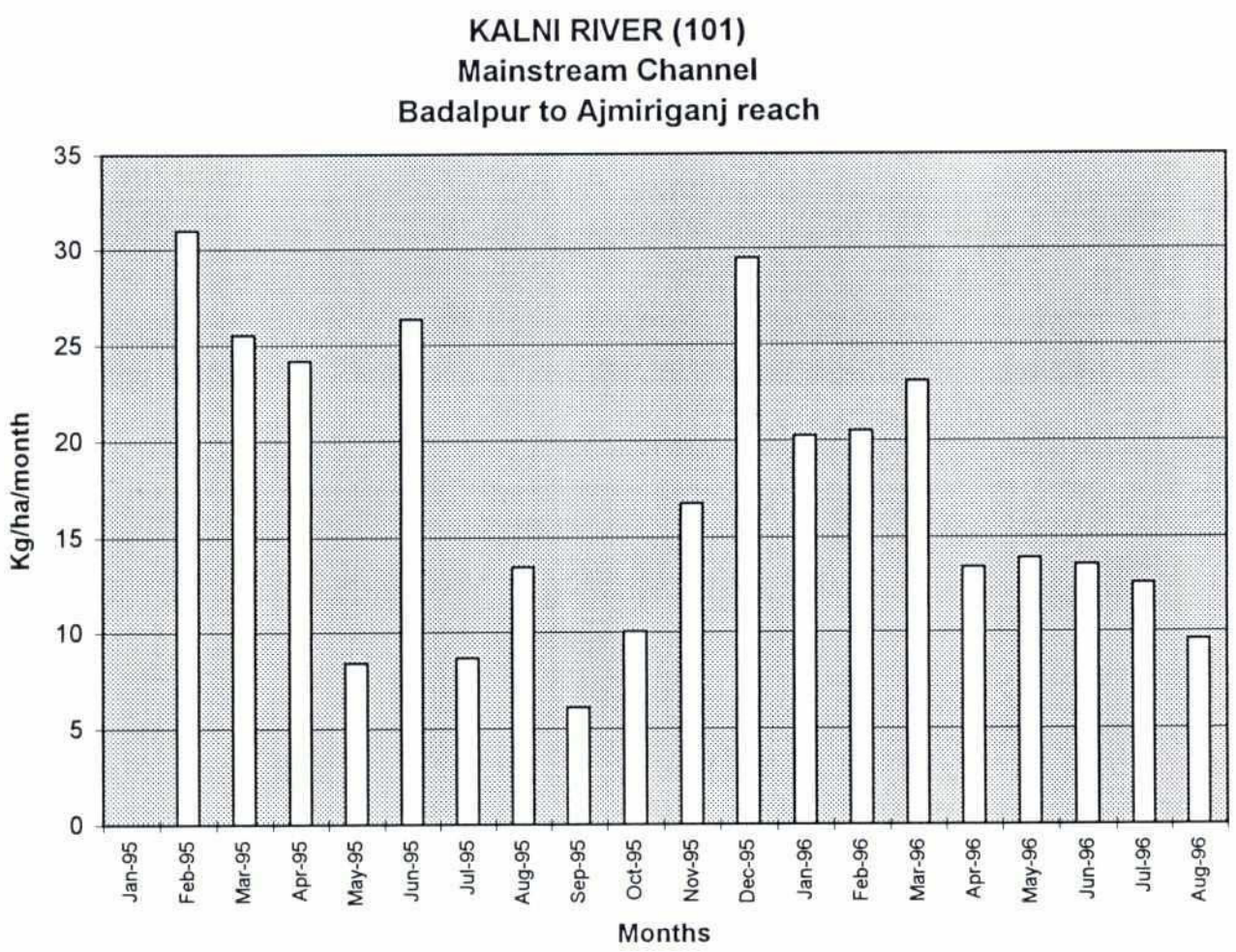


Figure H.27 Monthly Standing Crop Index of Kalni River (104)

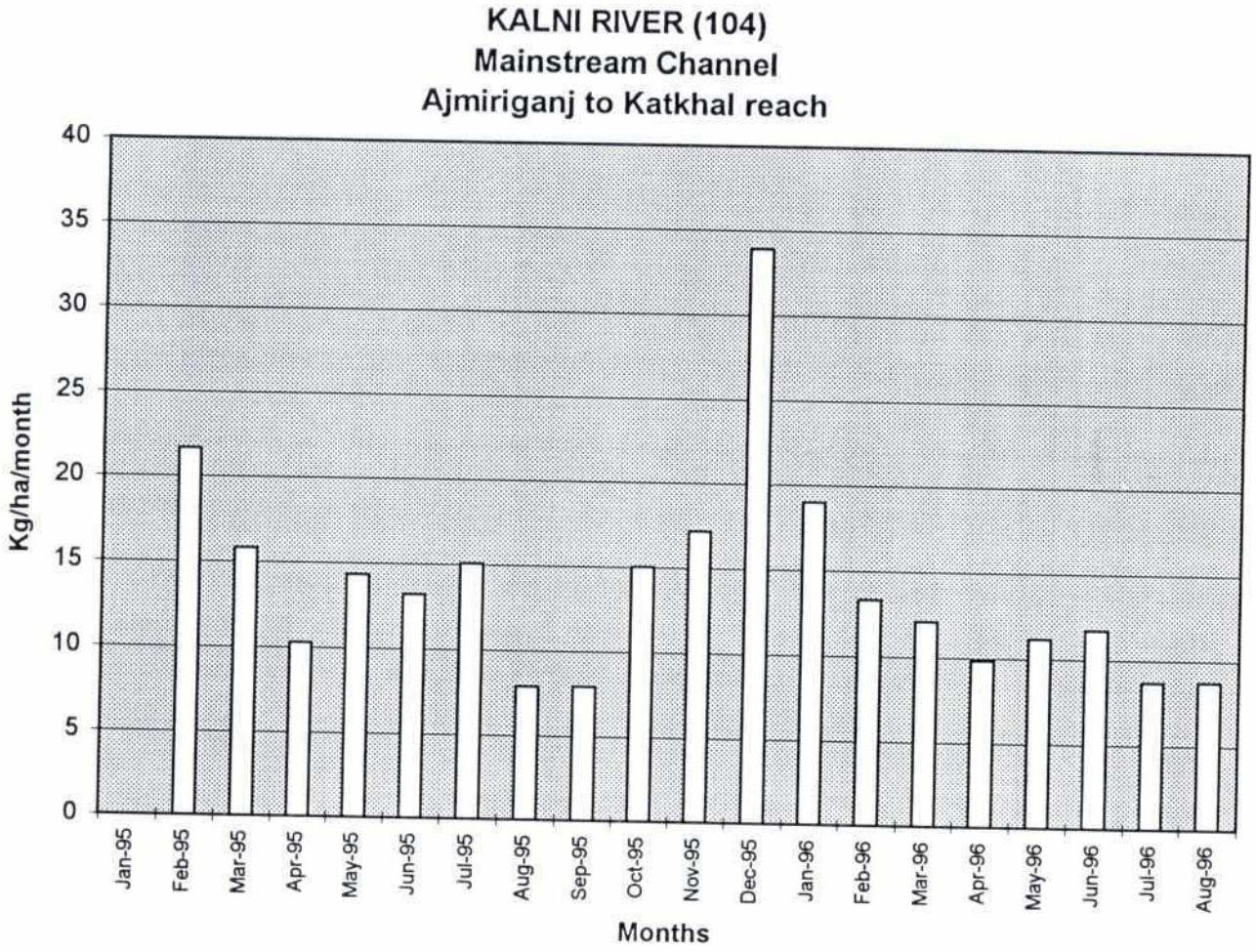


Figure H.28 Monthly Standing Crop Index of Gudimukh Duar (121)

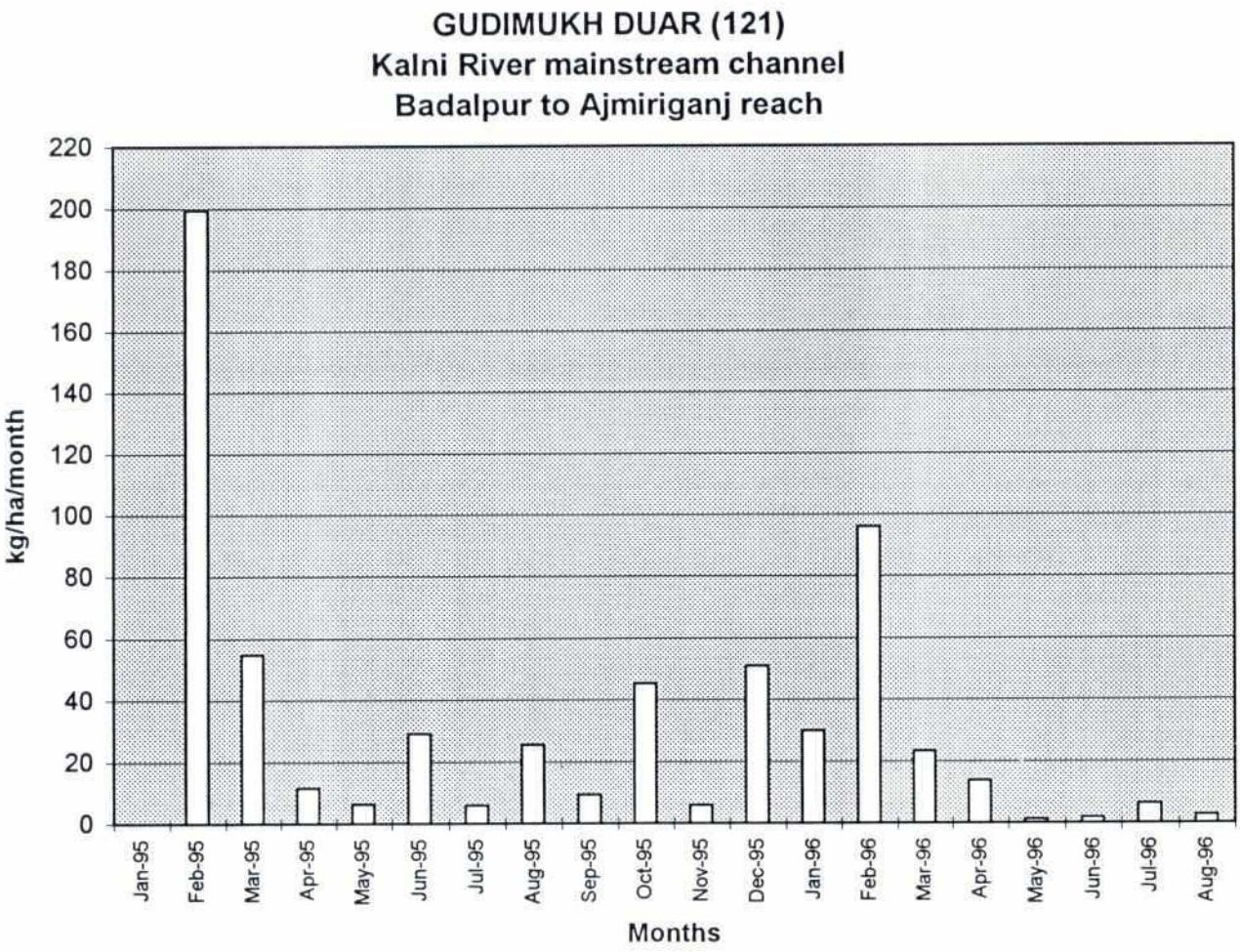


Figure H.29 Monthly Standing Crop Index of Mahtabpur Duar (122)

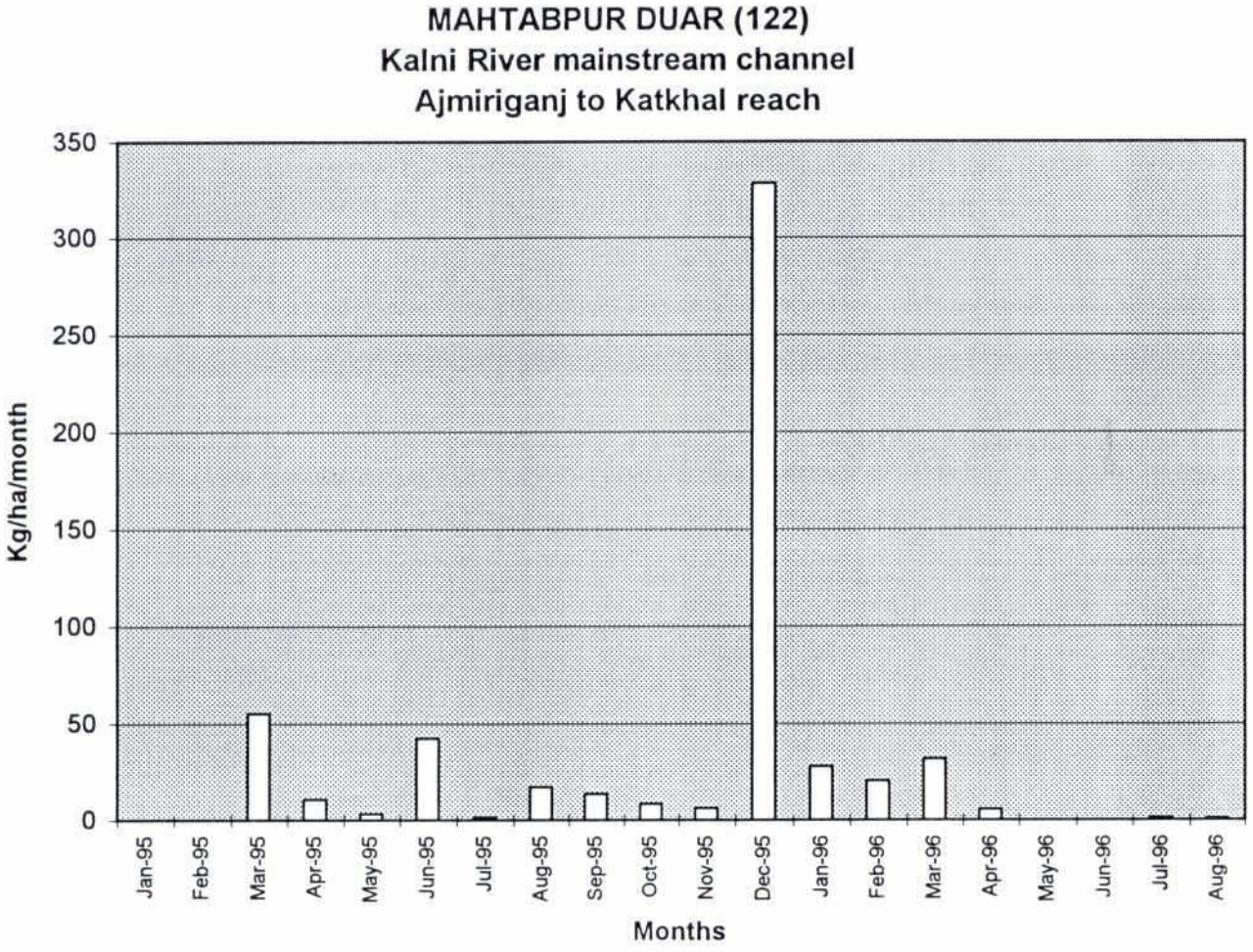


Figure H.30 Monthly Standing Crop Index of Shahebnagar Duar (123)

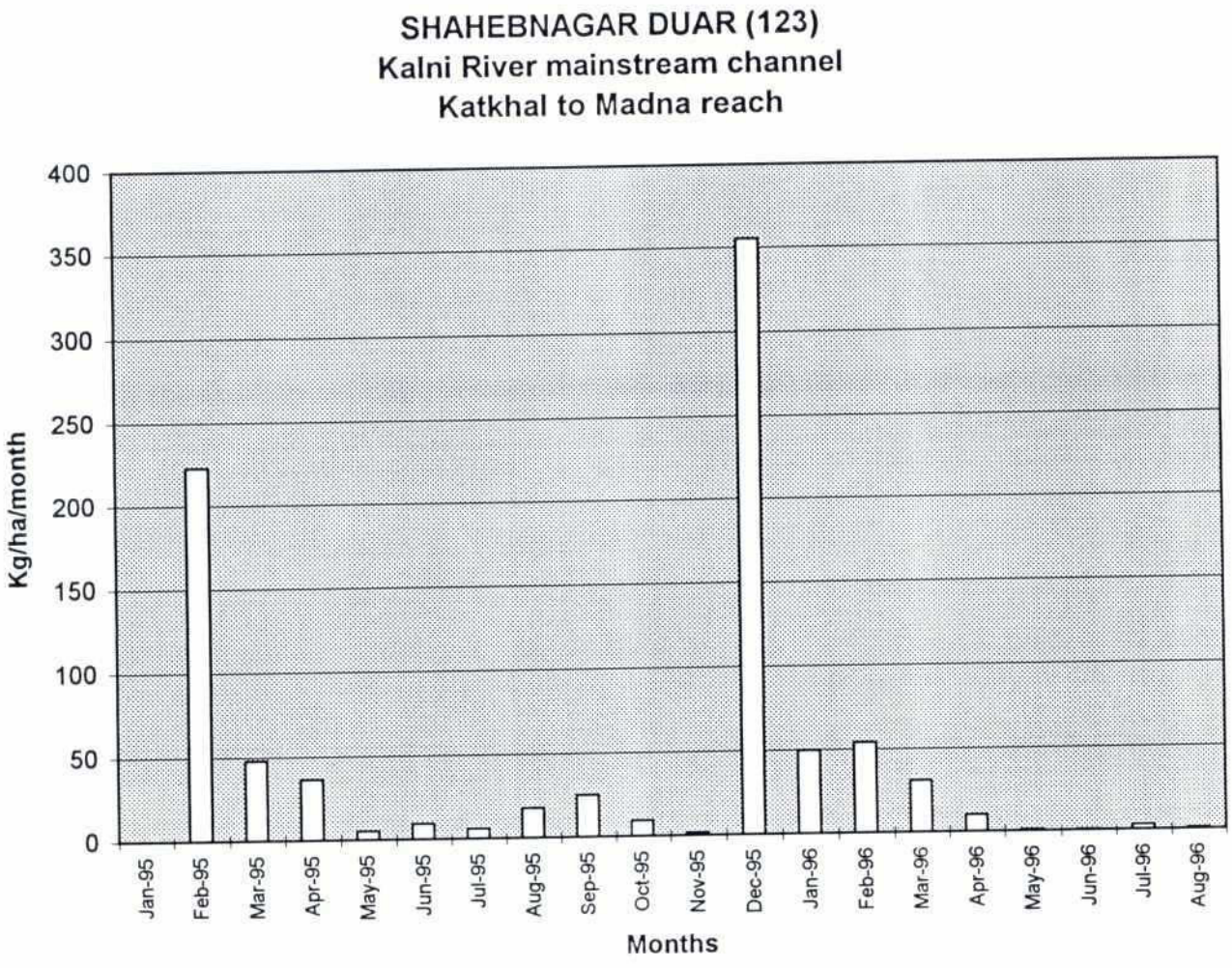


Figure H.31 Monthly Standing Crop Index of Kalni River (105)

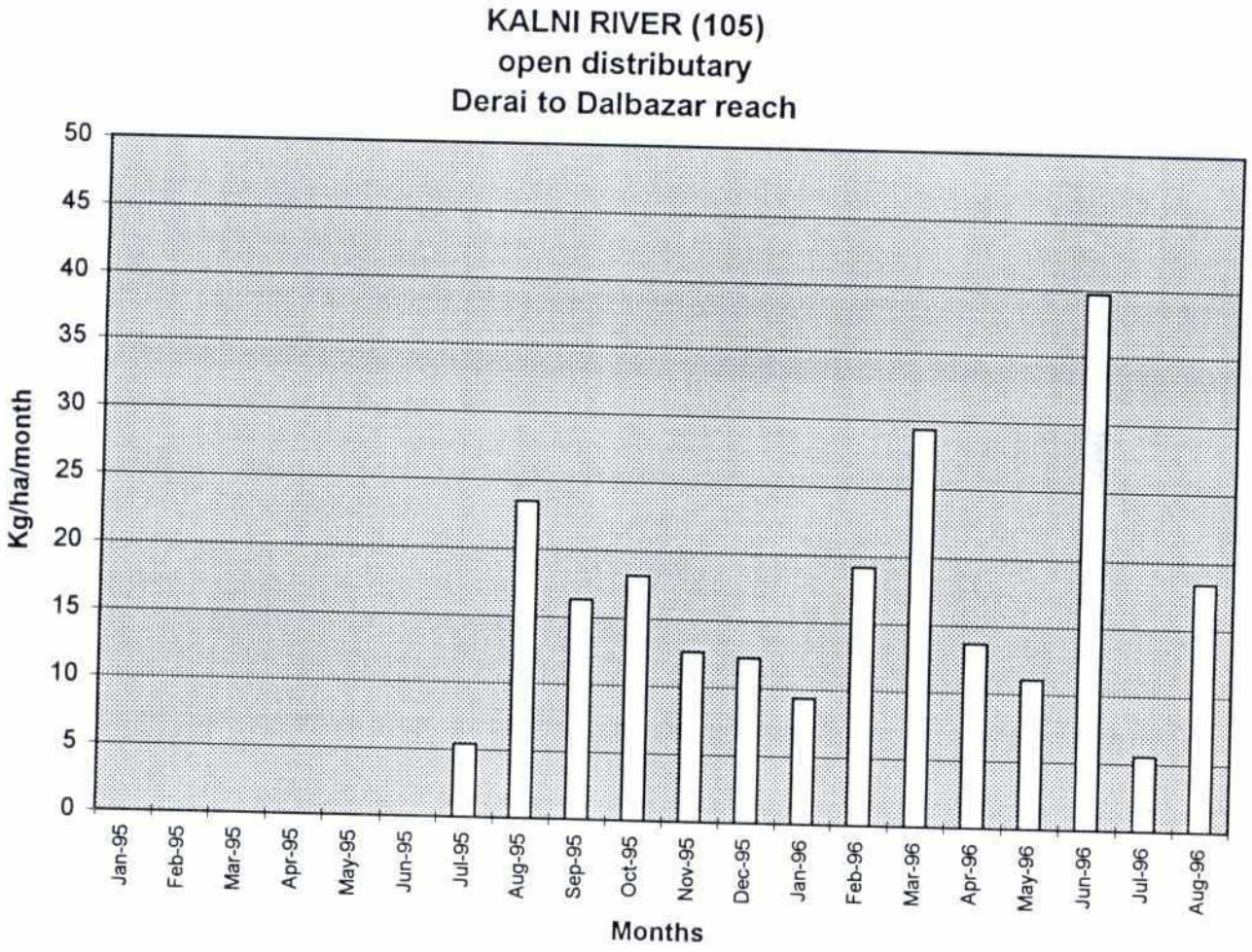


Figure H.32 Monthly Standing Crop Index of Sinai River (106)

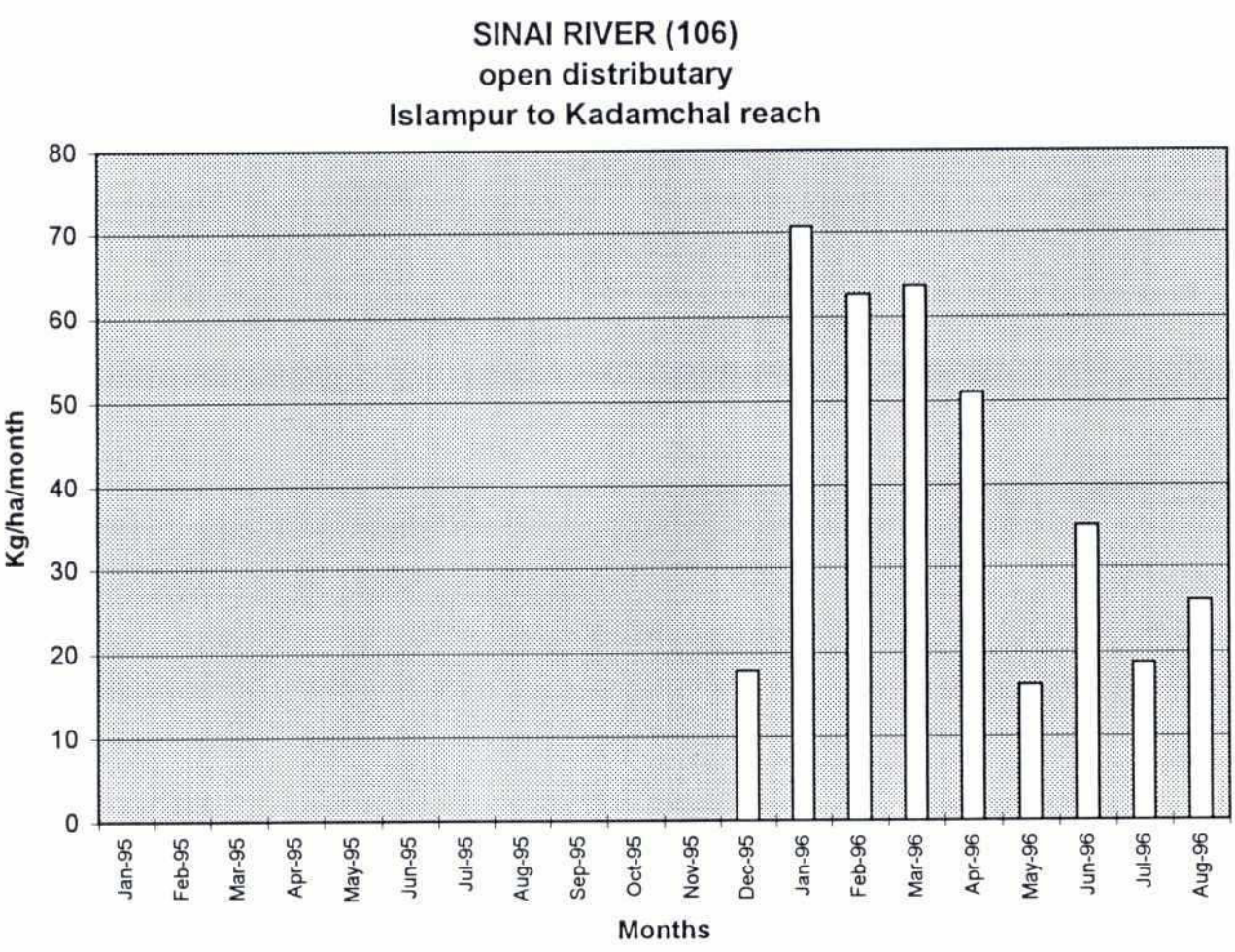


Figure H.33 Monthly Standing Crop Index of Kalni River (130)

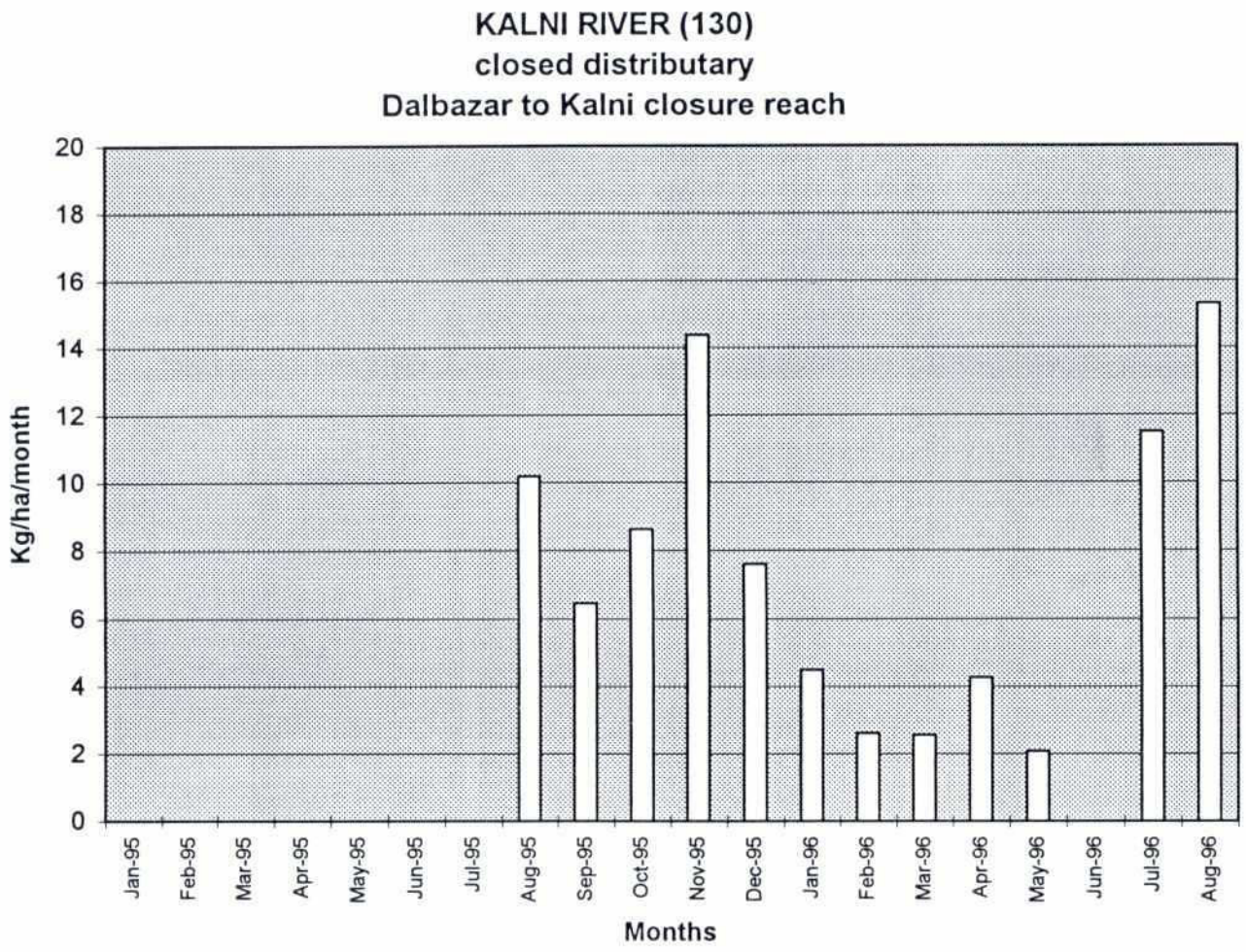


Figure H.34 Monthly Standing Crop Index of Old Kushiyara River (131)

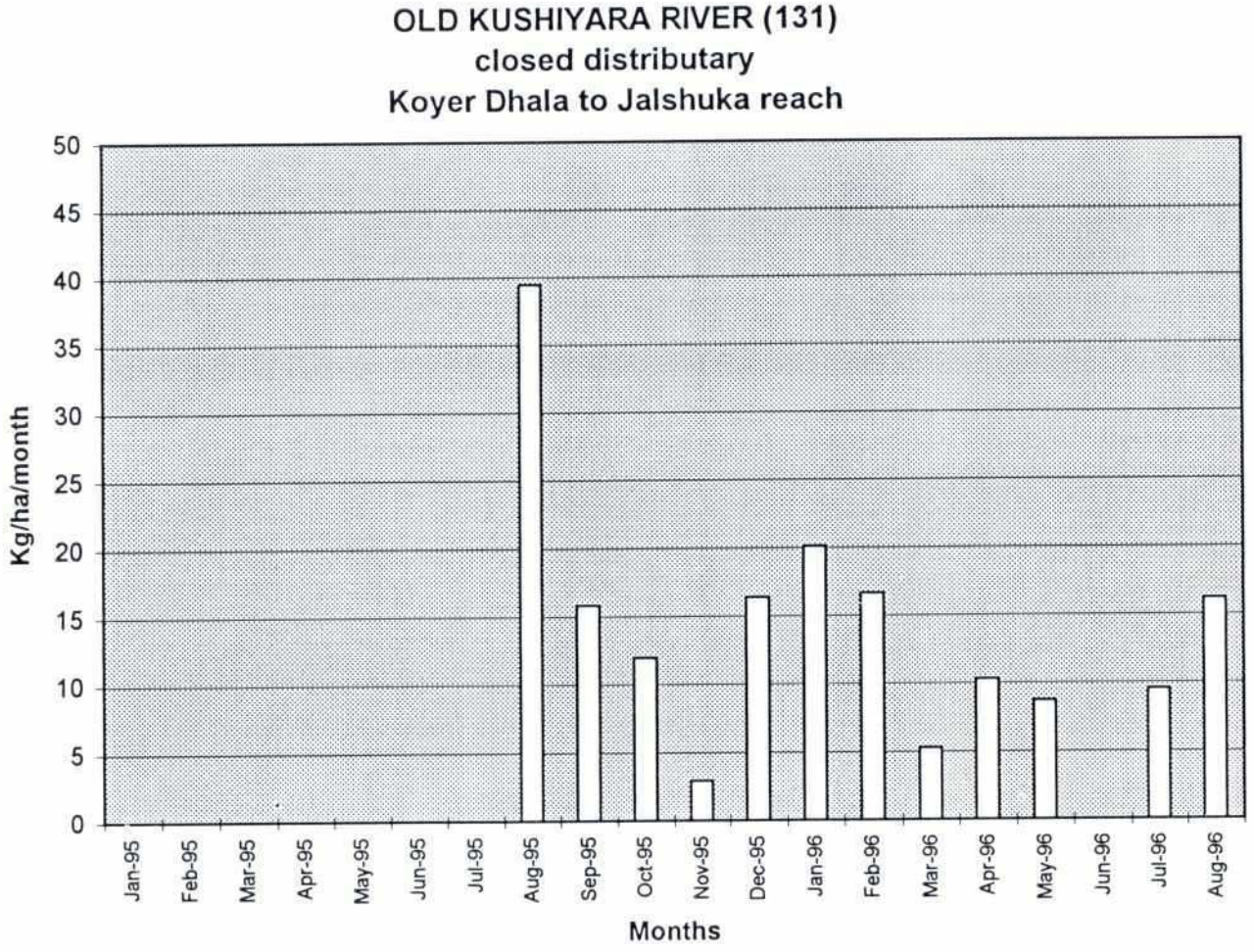
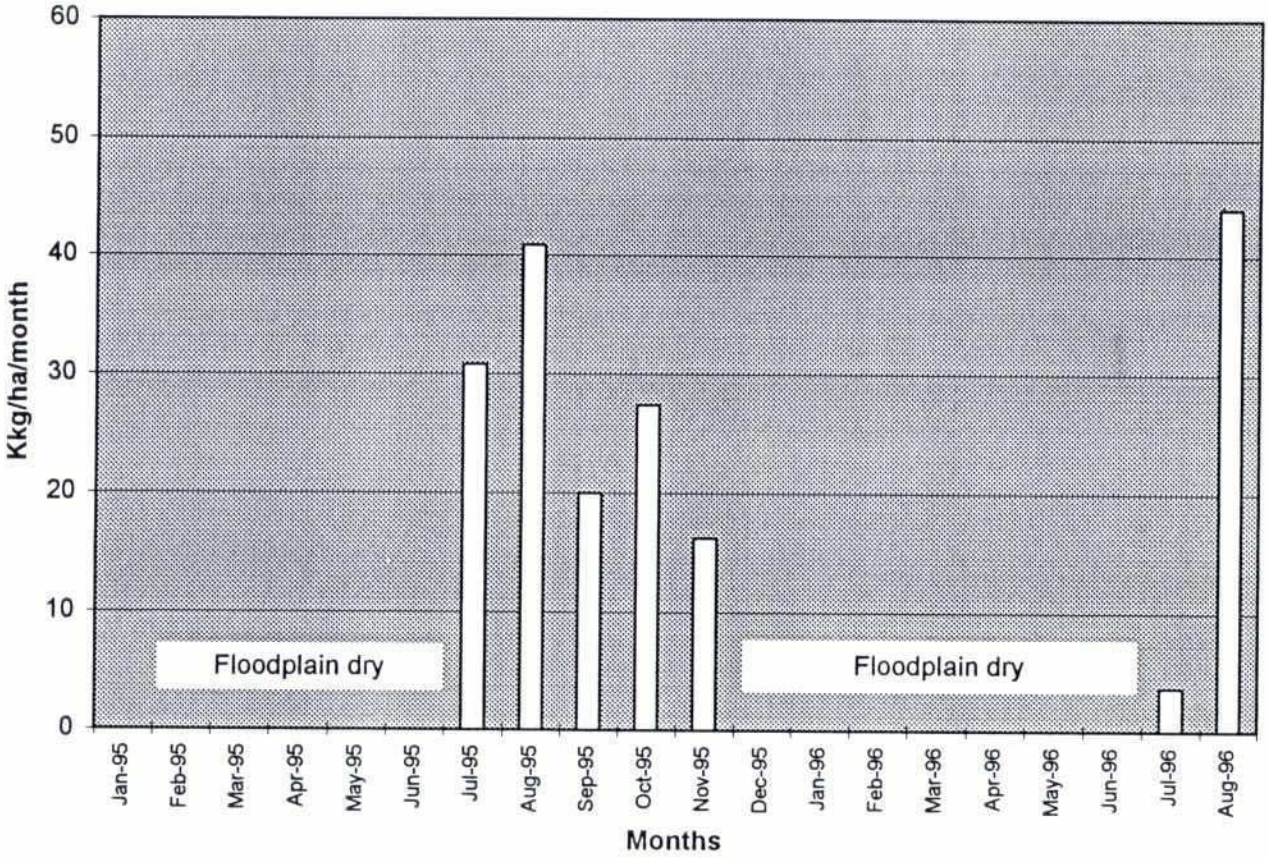


Figure H.35 Monthly Standing Crop Index of Kumarpara Floodplain (114)



207

Figure H.36 Monthly Standing Crop Index at Gazaria (PU 1)

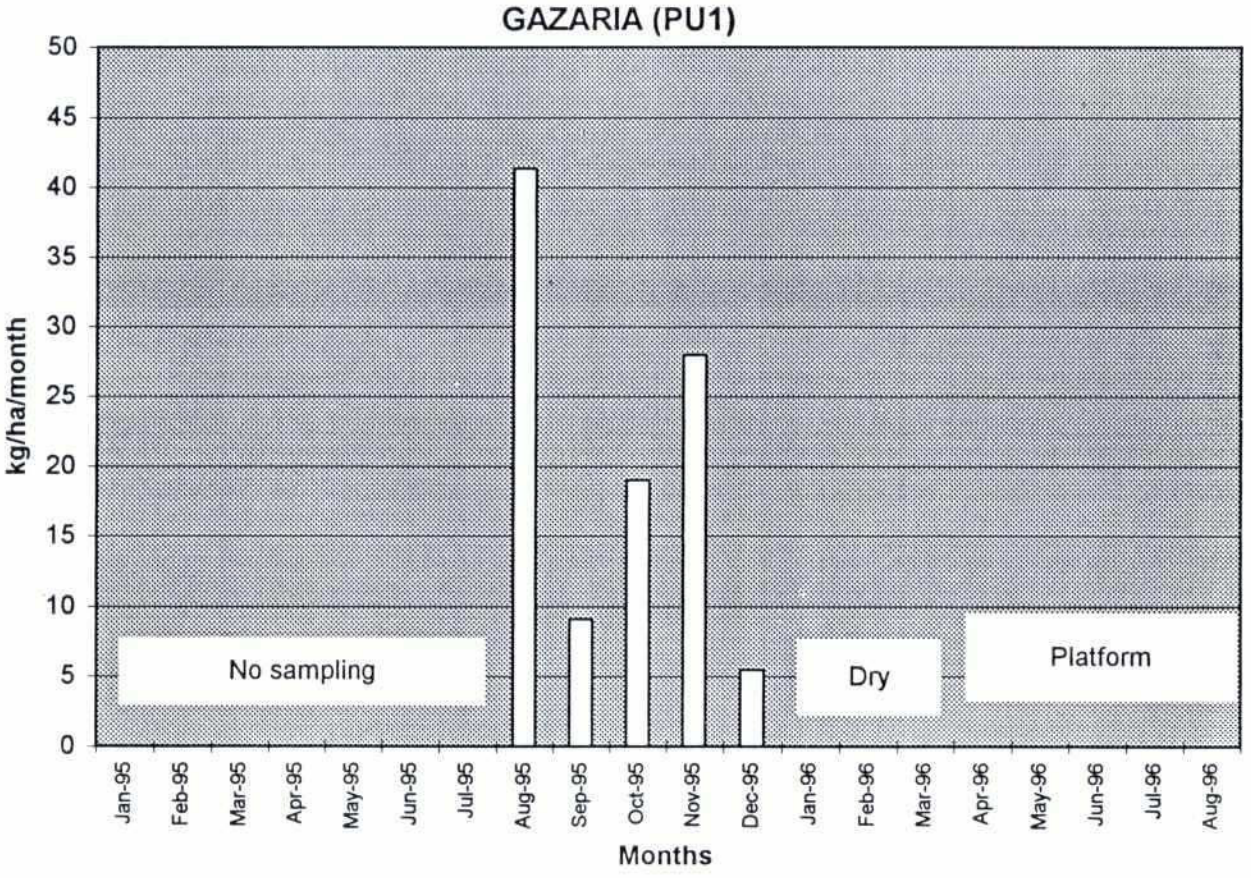


Figure H.37 Monthly Standing Crop Index at Shahnagar (PU 2)

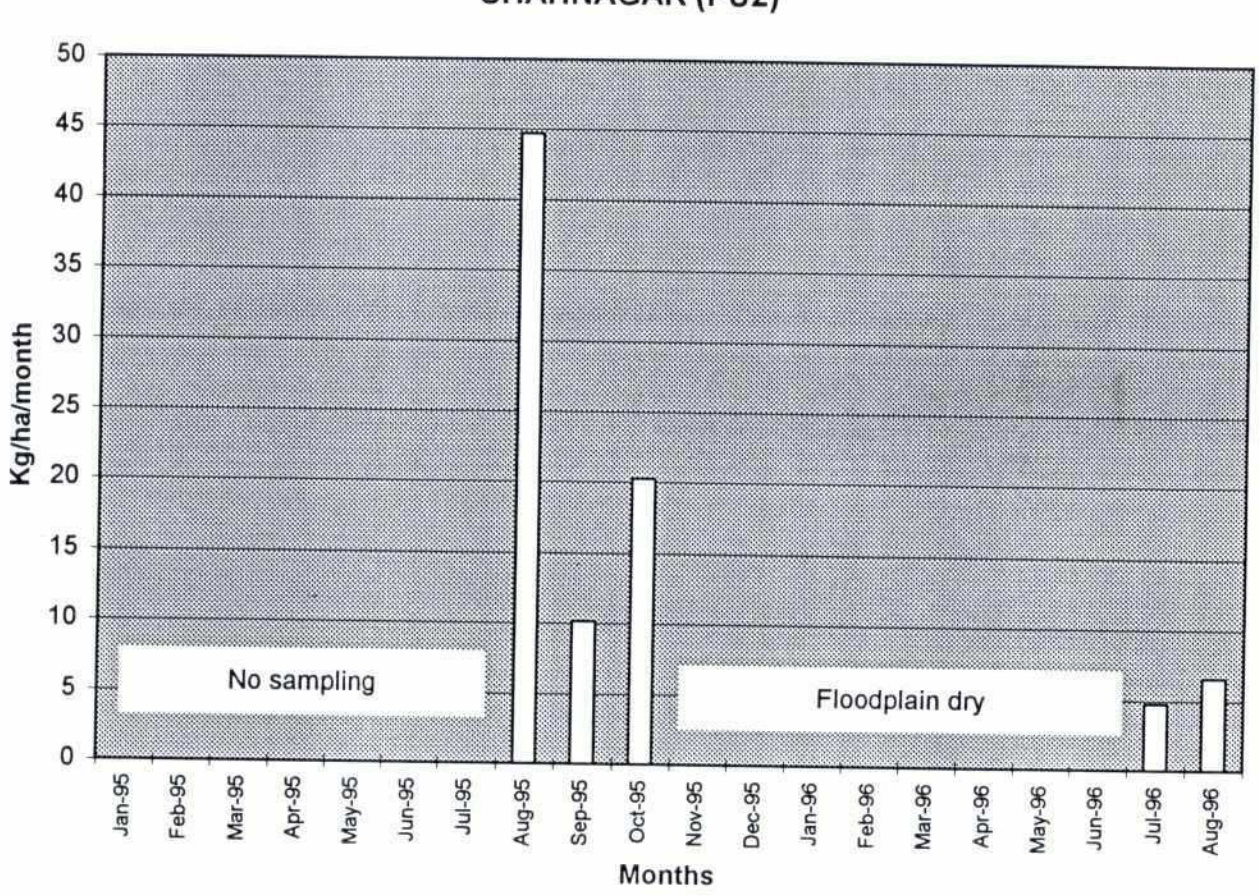


Figure H.38 Monthly Standing Crop Index at Kakailseo (PU 4)

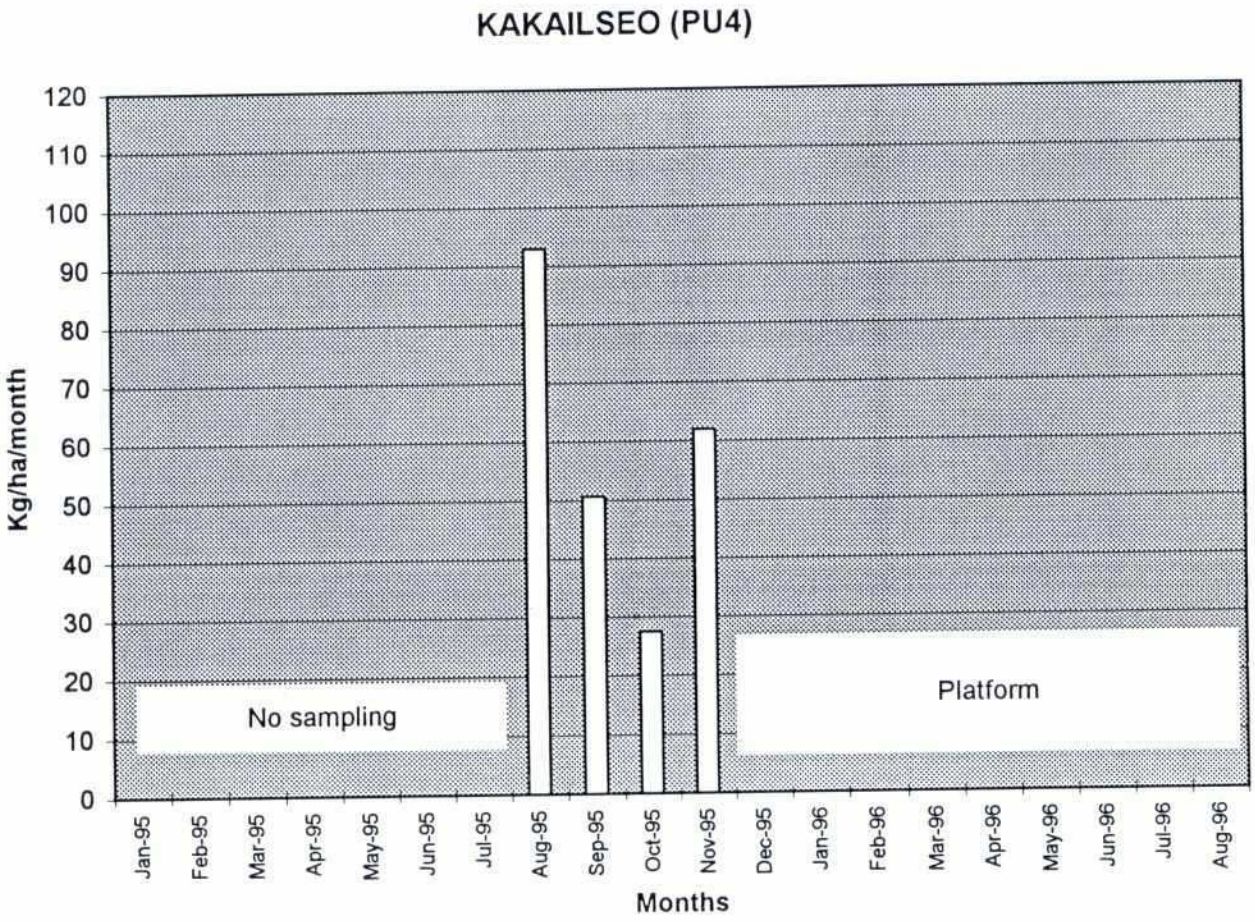


Figure H.39 Monthly Standing Crop Index at Katkhal (PU 5)

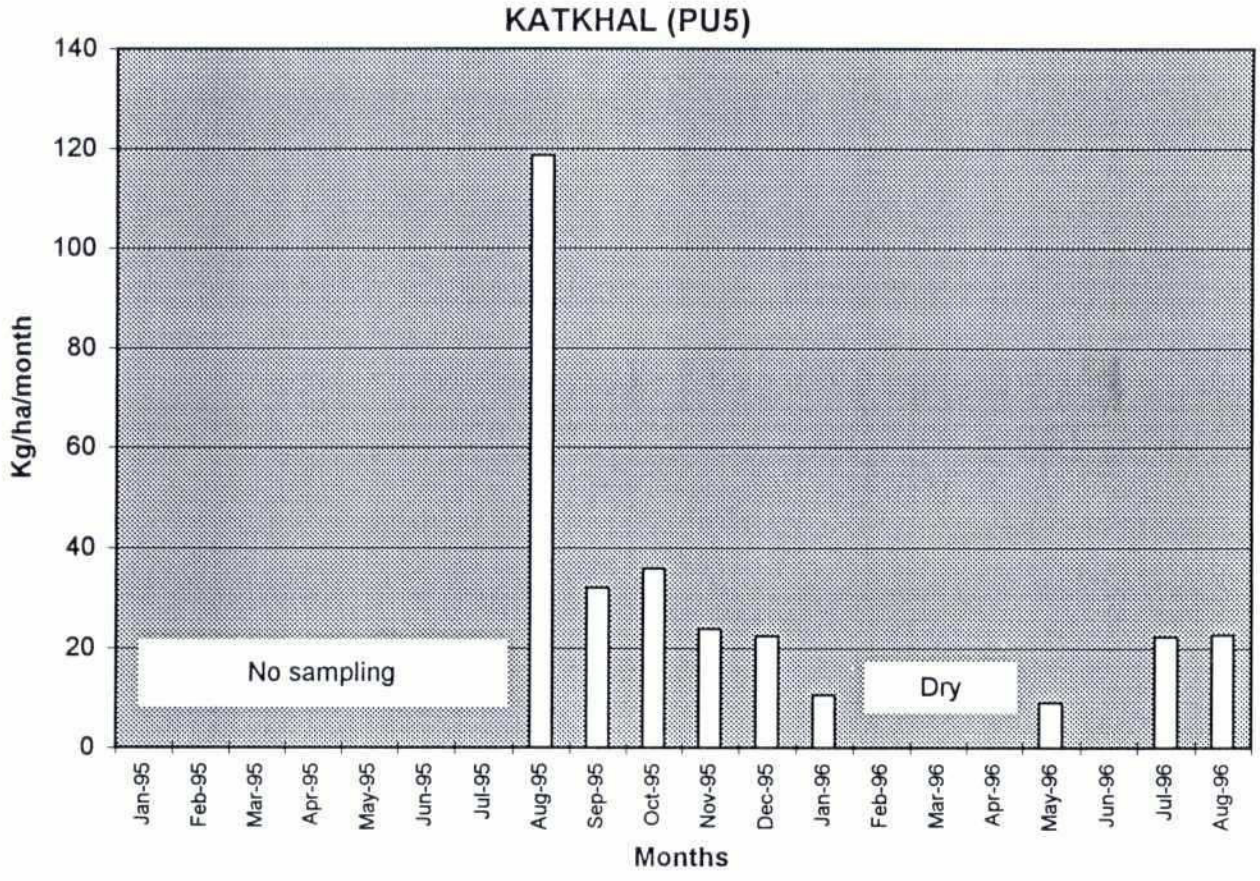


Figure H.40 Monthly Standing Crop Index of Bheramohona Beel (132)

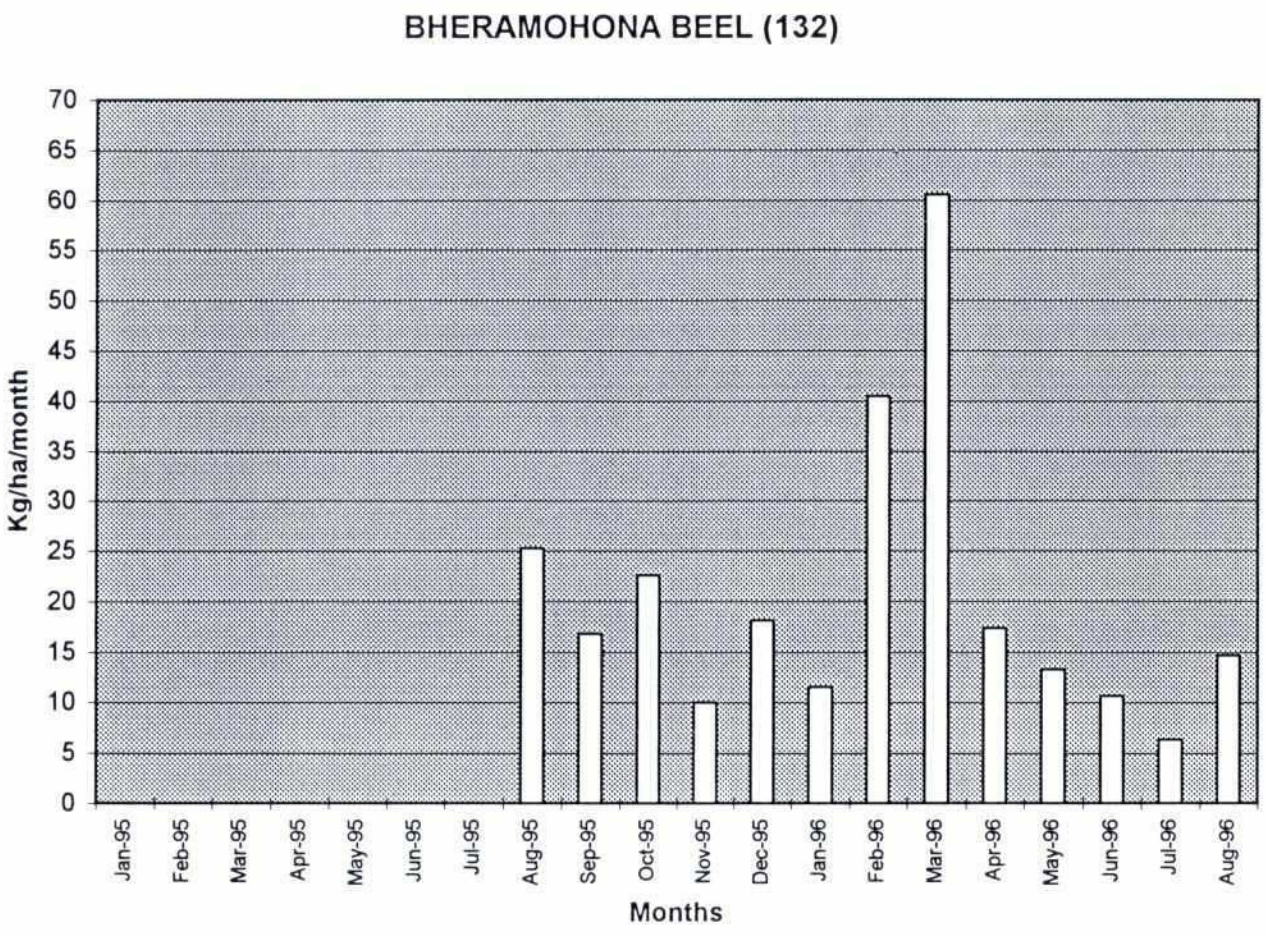


Figure H.41 Monthly Standing Crop Index of Biddyakhola Beel (113)

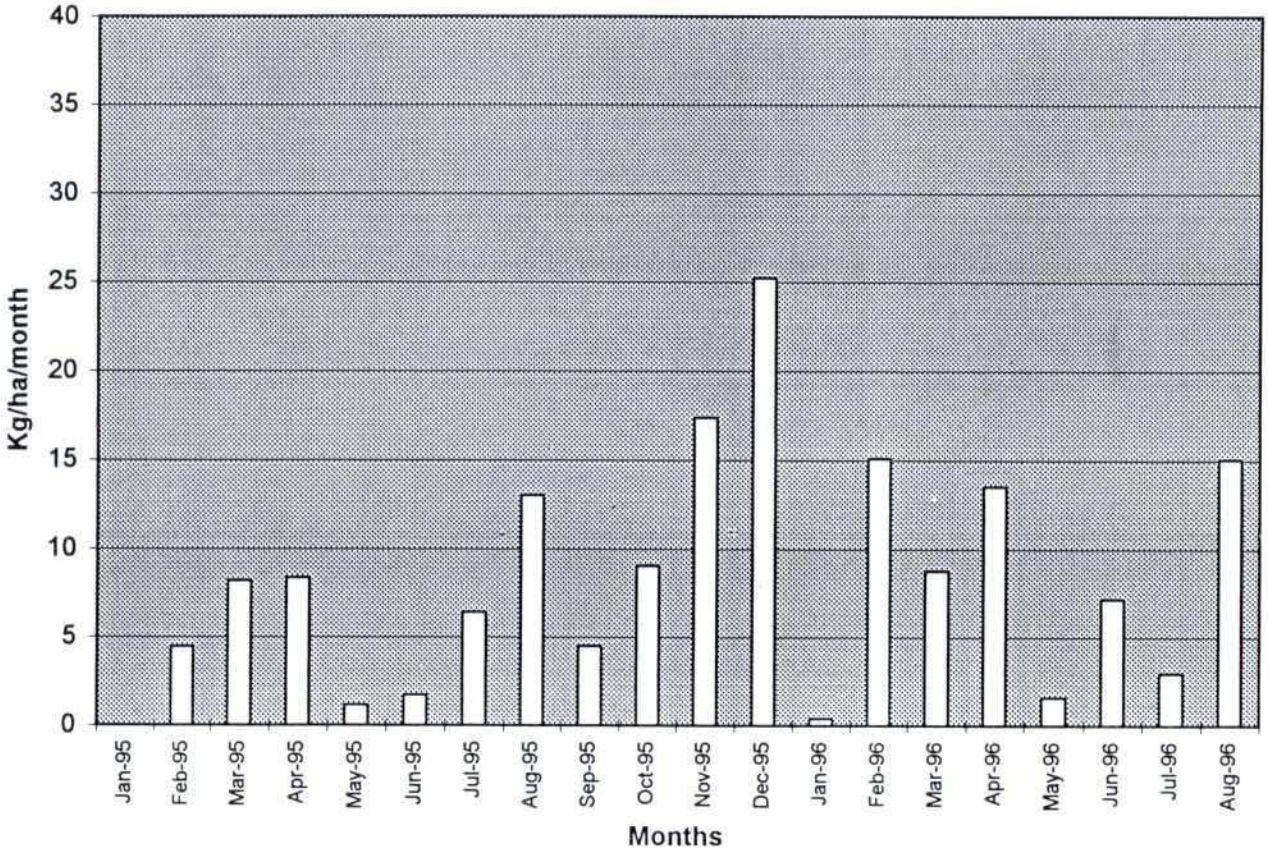


Figure H.42 Monthly Standing Crop Index of Dhuiya Beel (112)

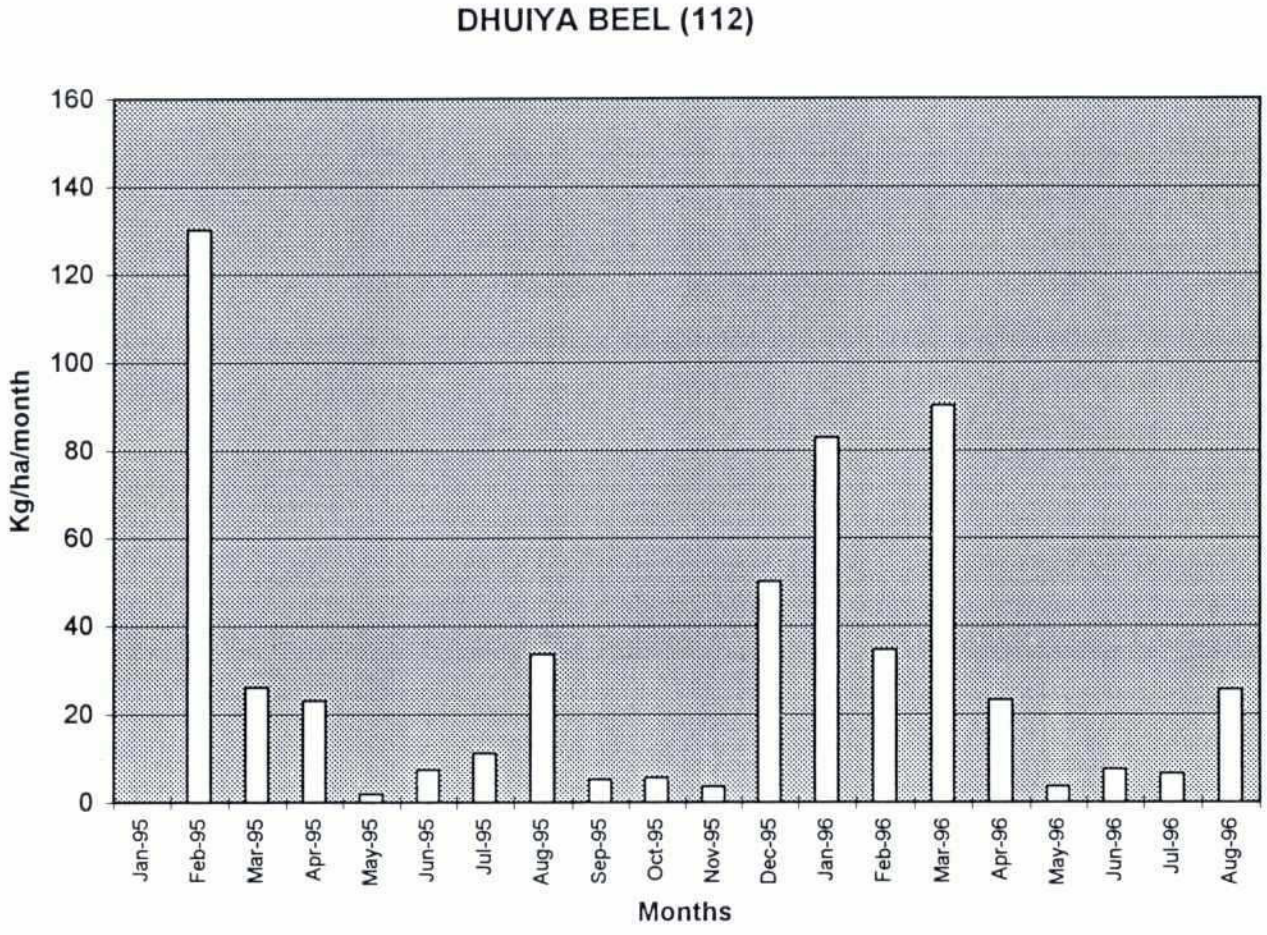


Figure H.43 Monthly Standing Crop Index of Barogop Beel (111)

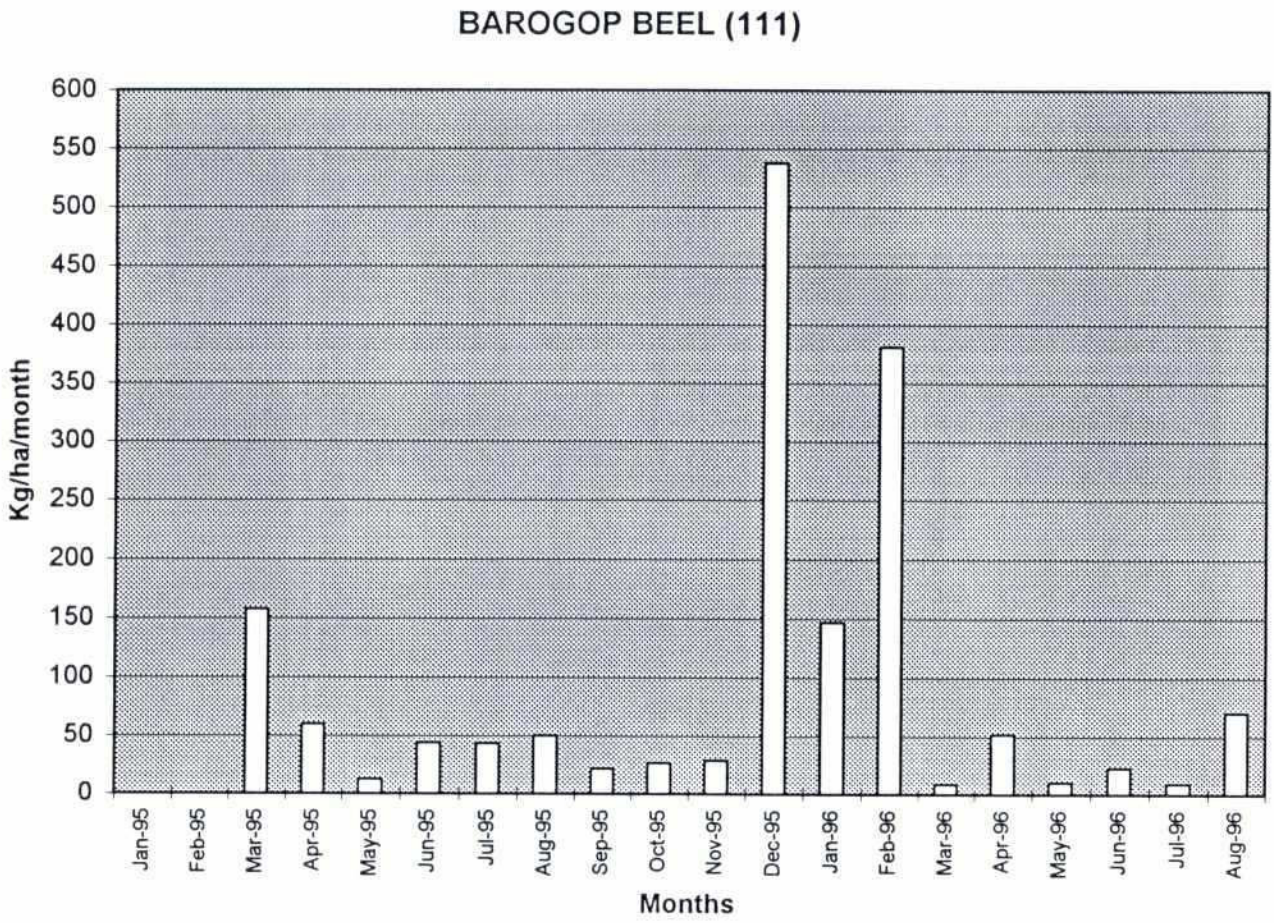


Figure H.44 Fish production by Habitat Type in Project Area
period: August 1995 to July 1996

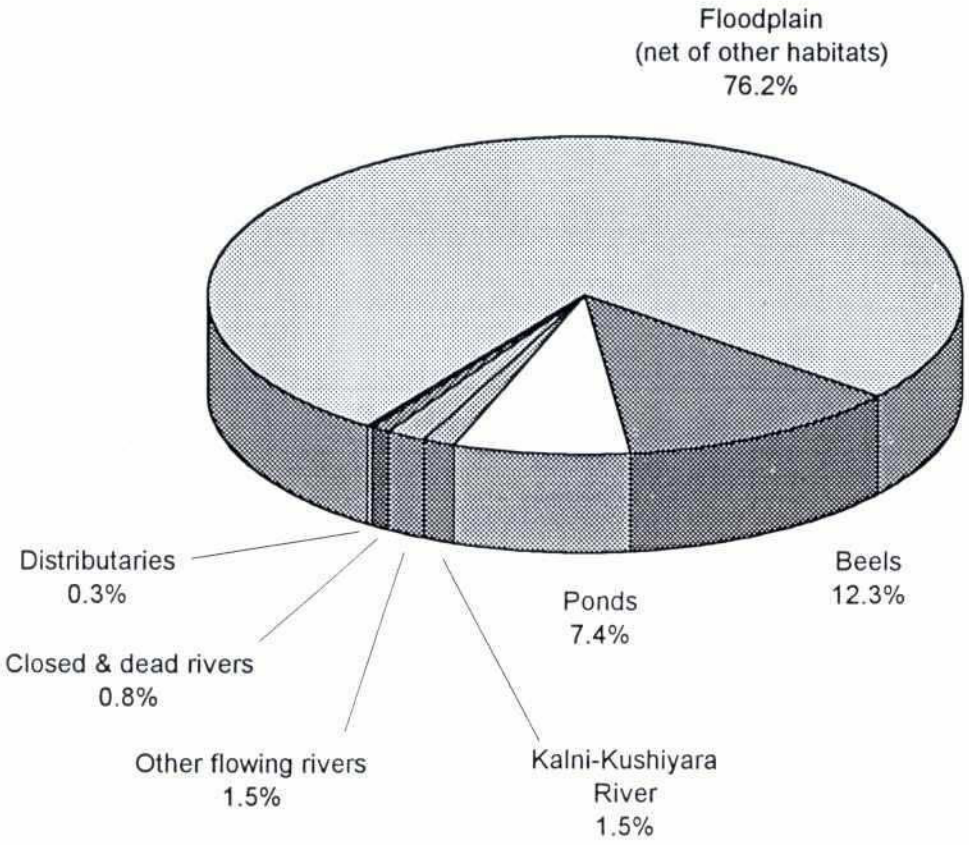


Figure H.45 Comparison of Standing Crop of Aquatic Habitats in Project Area

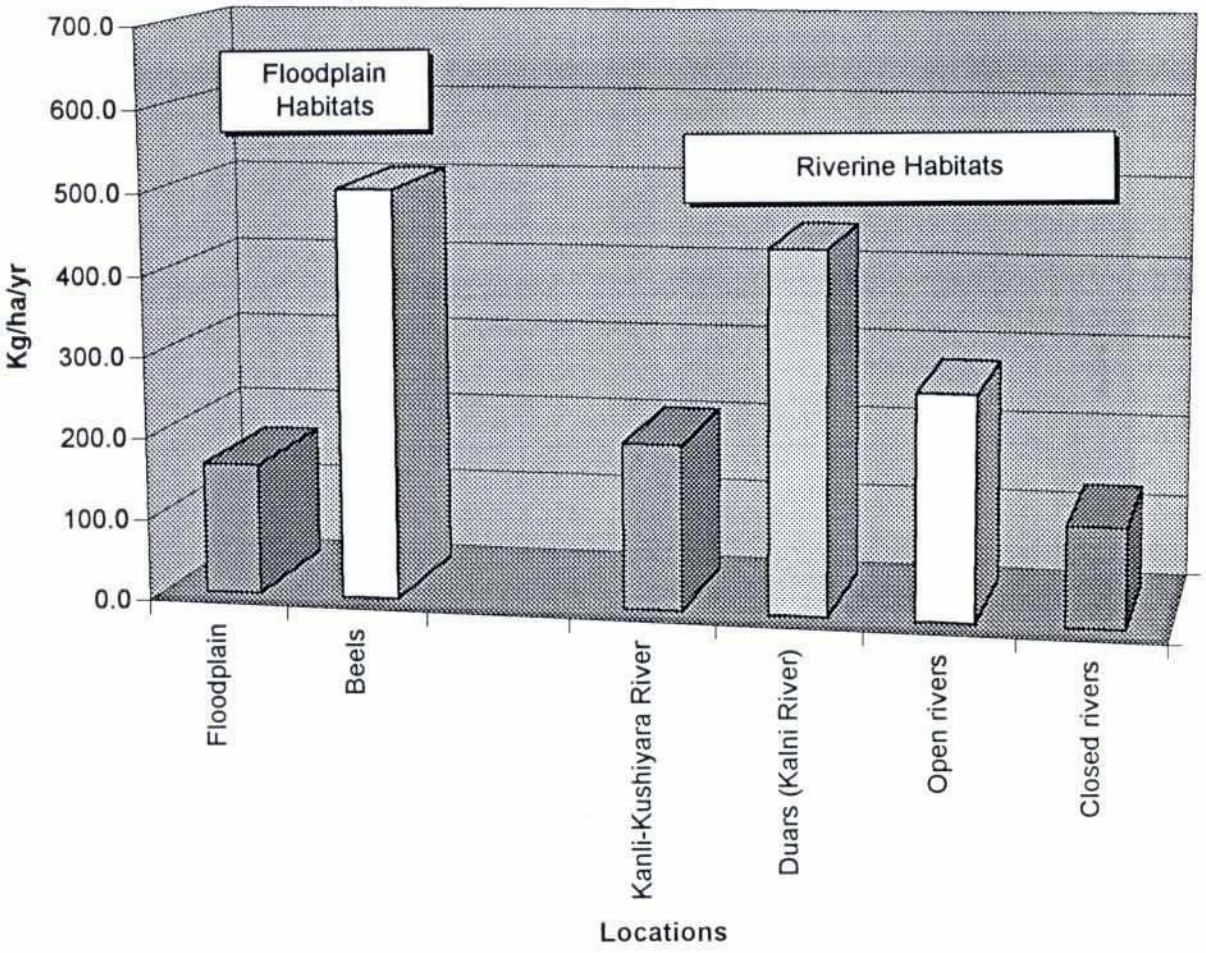


Figure H.46 Annual Standing Crop of Riverine Habitats in Project Area (Aug 95 to Jul 96)

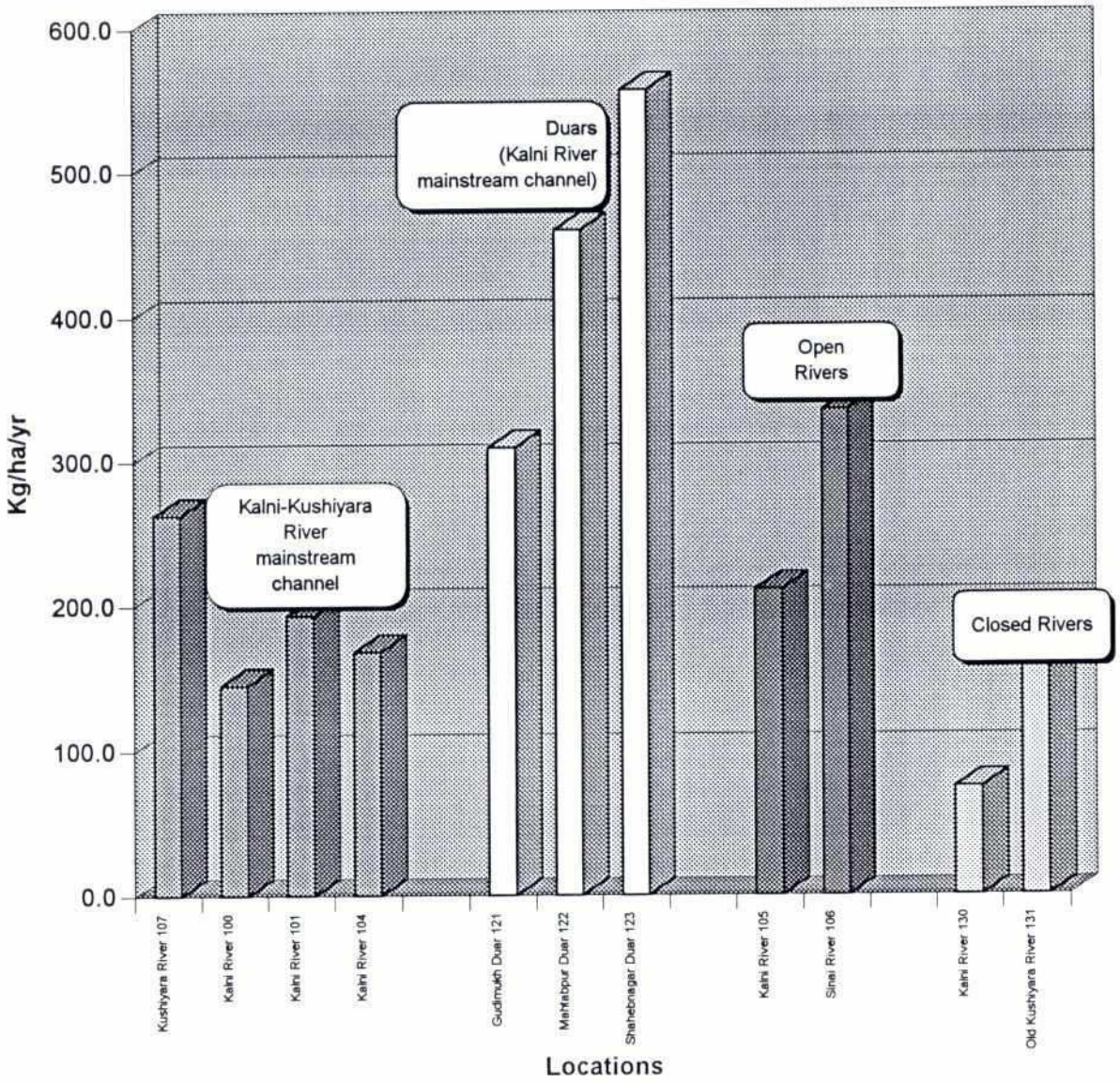


Figure H.47 Annual Standing Crop of Floodplain Habitats in Project Area

(Aug 95 to Jul 96)

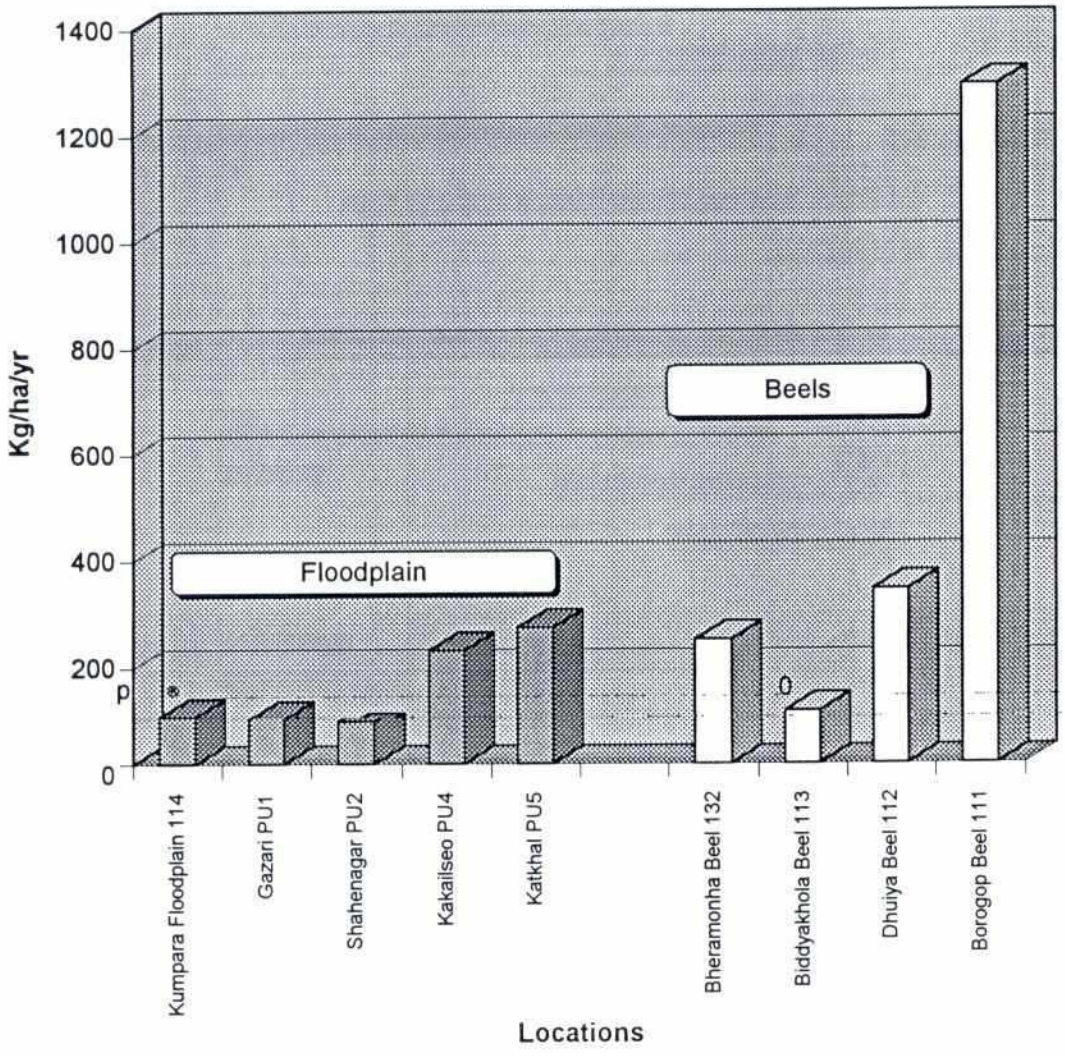


Figure H.48 Species Composition of Riverine Habitats in Project Area

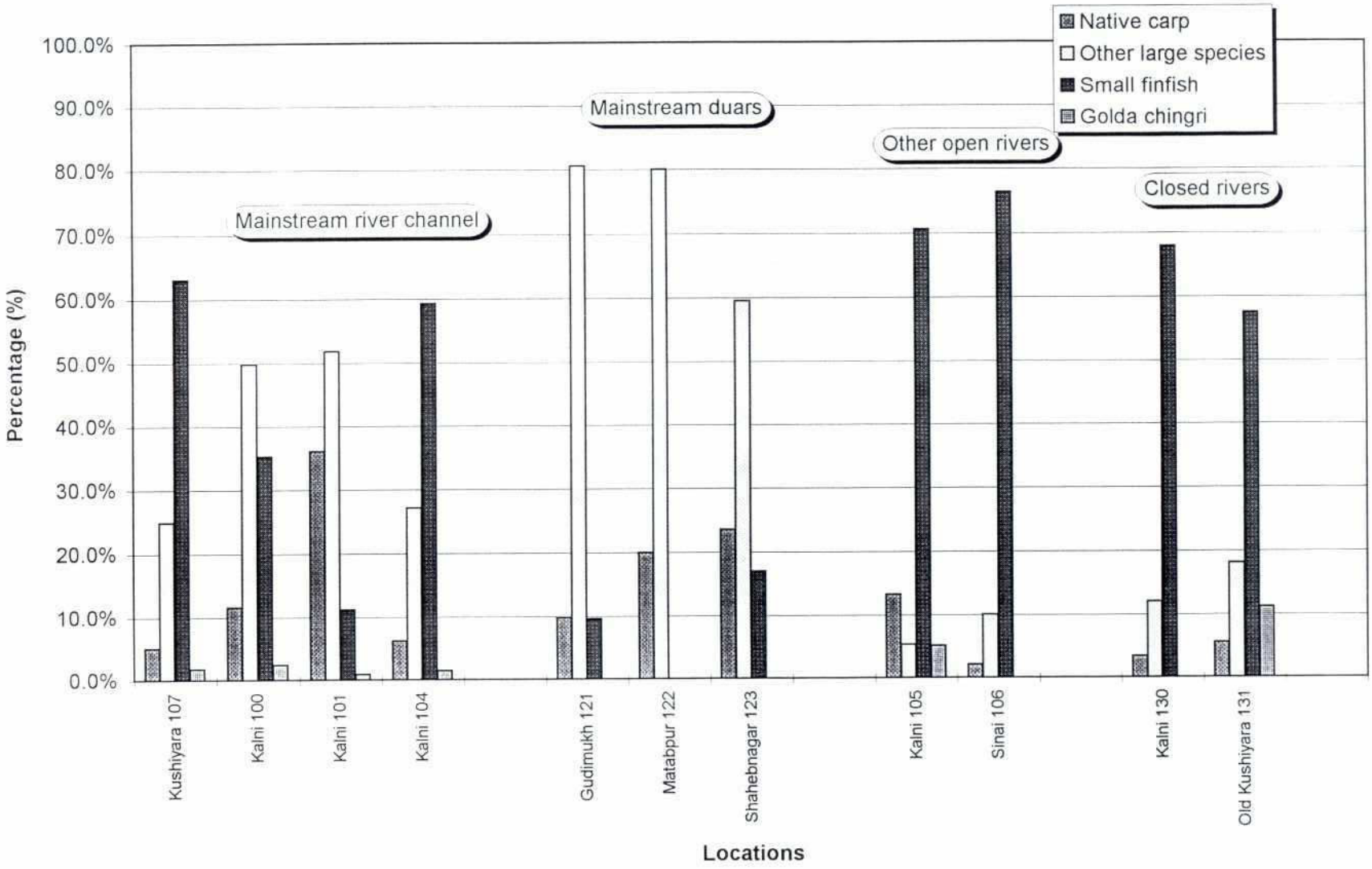


Figure H.49 Species Composition of Floodplain Habitats in Project Area

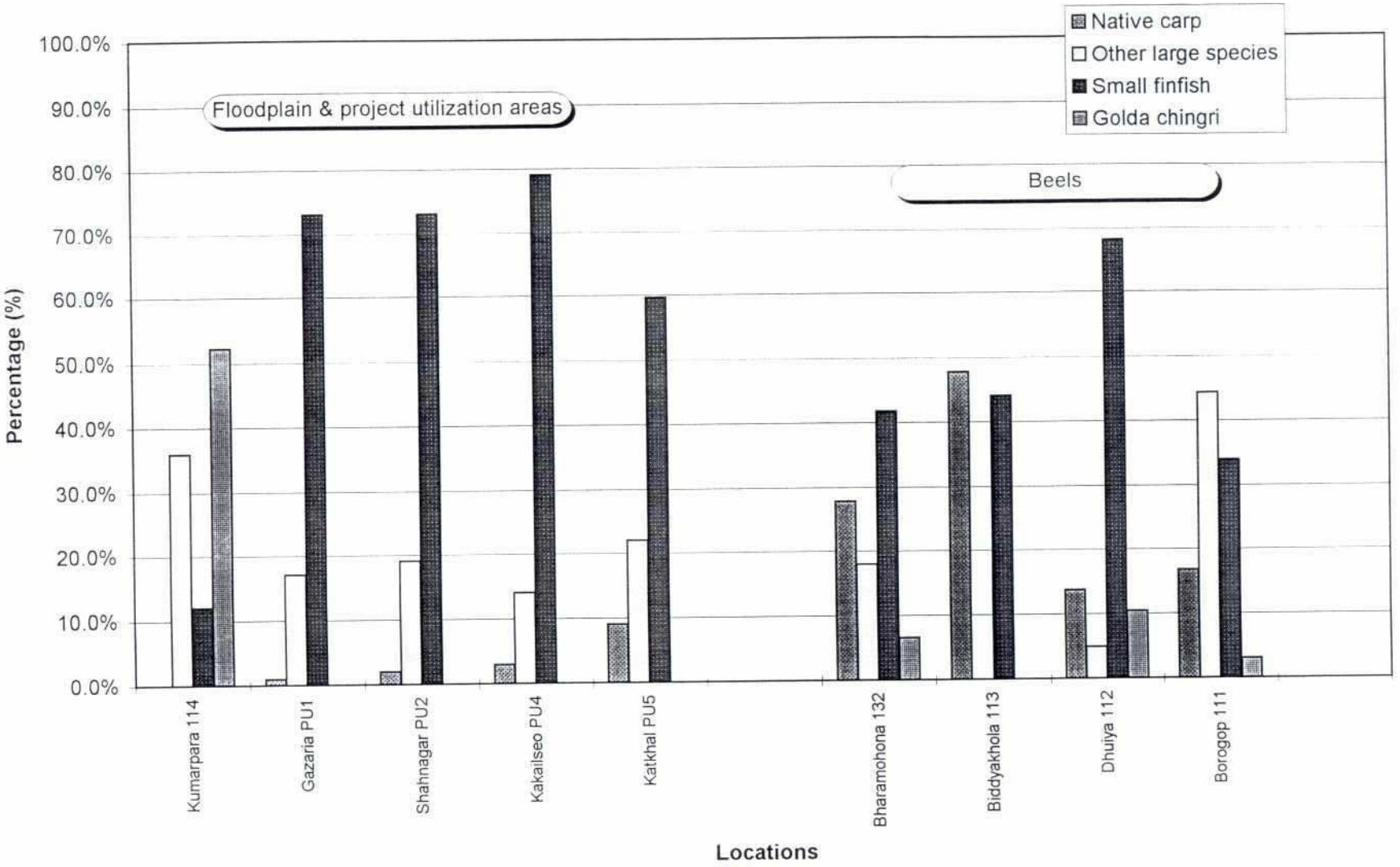


Figure H.50 Ranges of Daily Monsoon Flood Discharge of Upper Meghna River
Measurement station: Bhairab Bazar 273 Years: 1964 to 1993

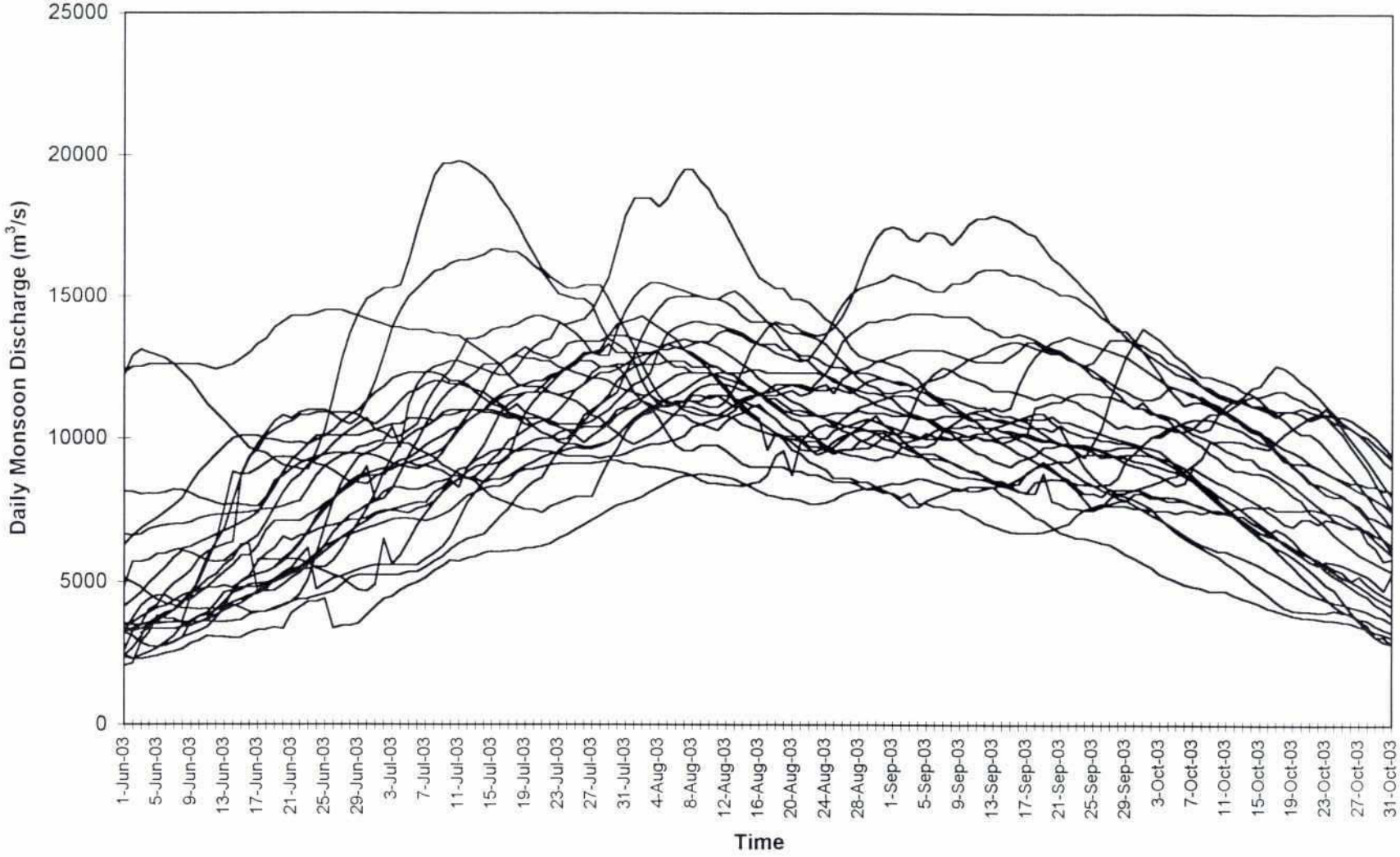


Figure H.51 Mean Annual Monsoon Discharge of Upper Meghna River at Bhairab Bazar

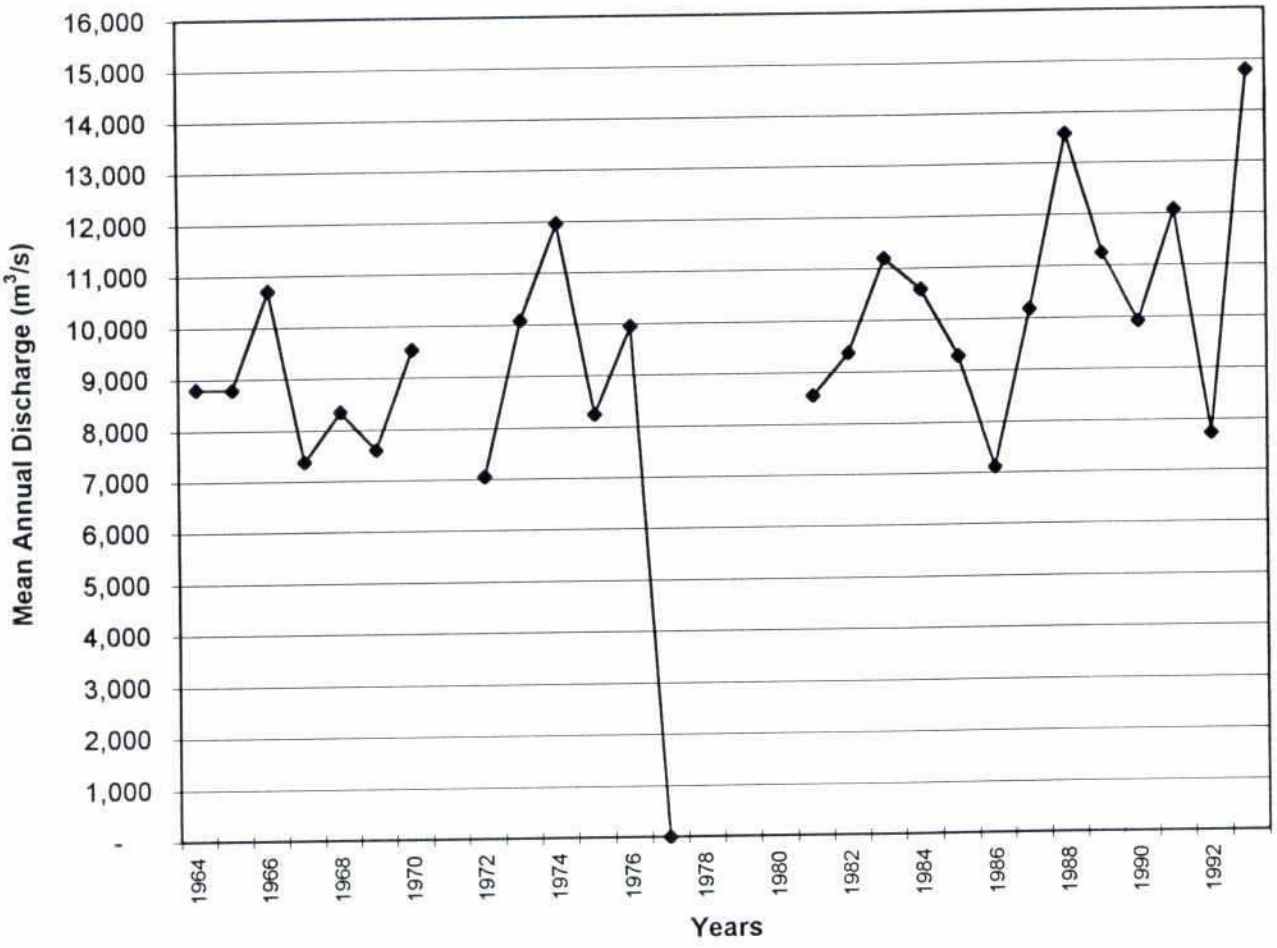


Figure H.52 Correlation between Total Fish Purchases of Ajmiriganj Fish Industries and Discharge of Upper Meghna River at Bhairab Bazar

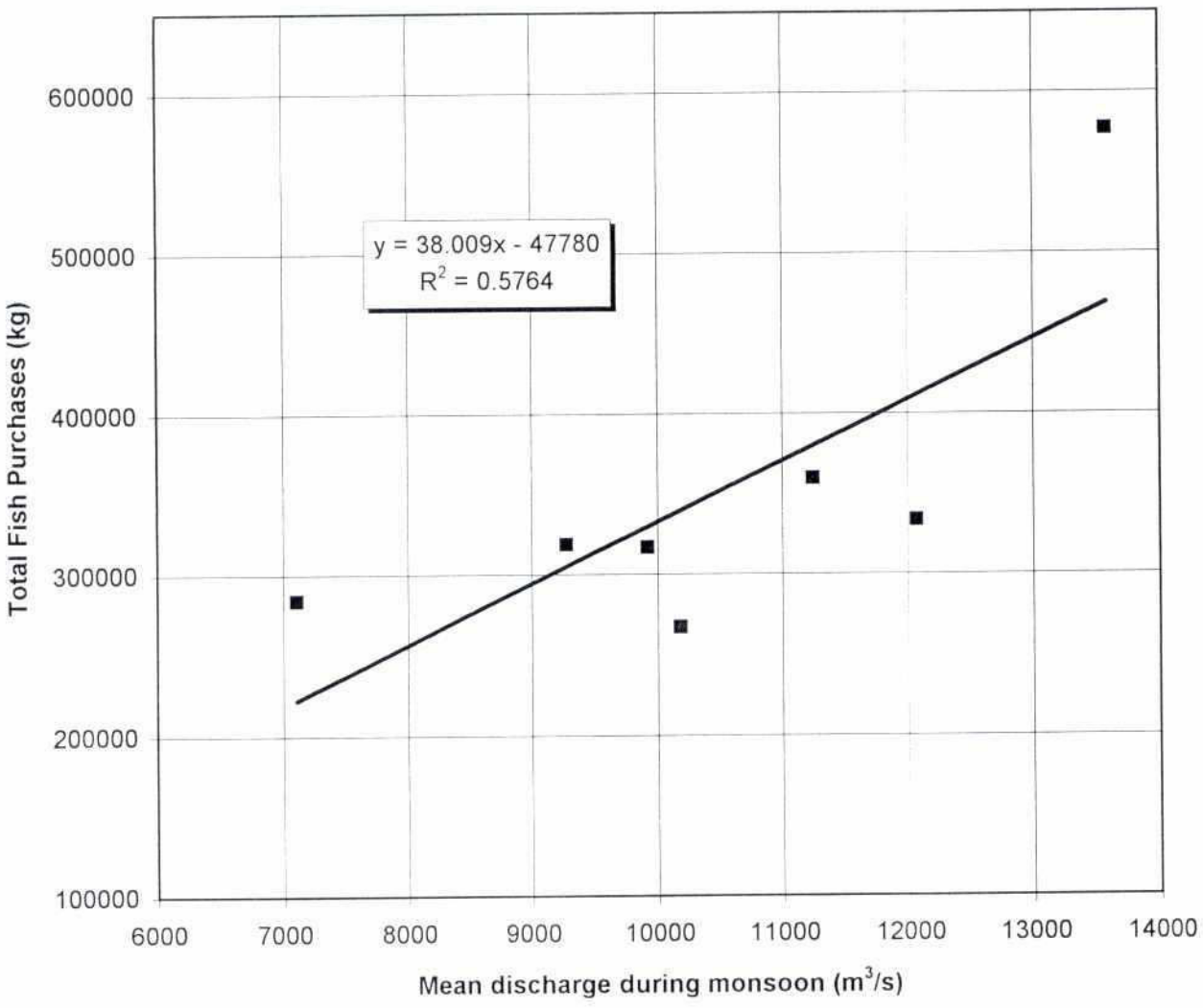


Figure H.53 Relationship between Channel Depth and Fish Standing Crop Index of Kalni-Kushiyara River

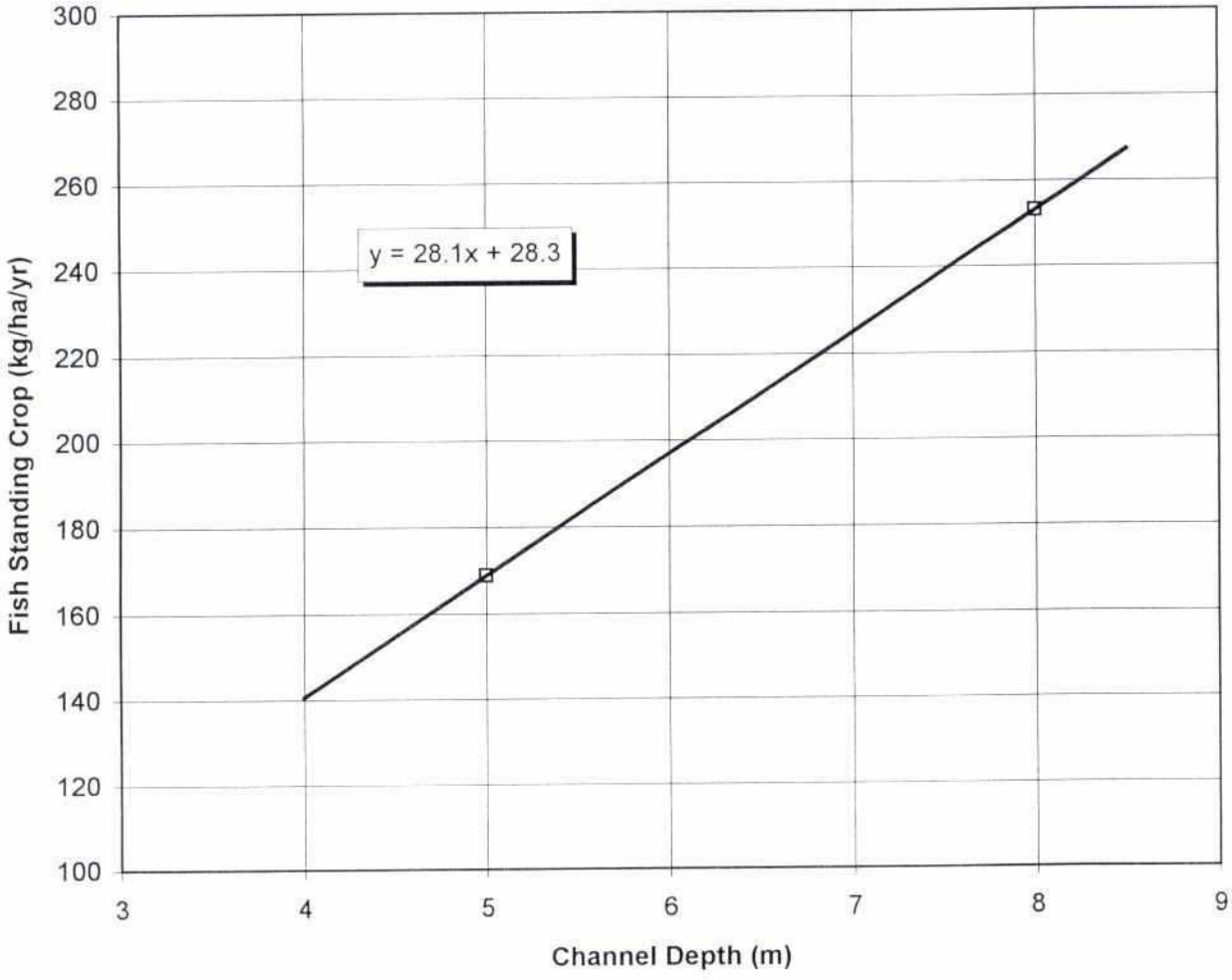


Figure H.54 Relationship between Maximum Depth & Fish Standing Crop Index of Selected Beels

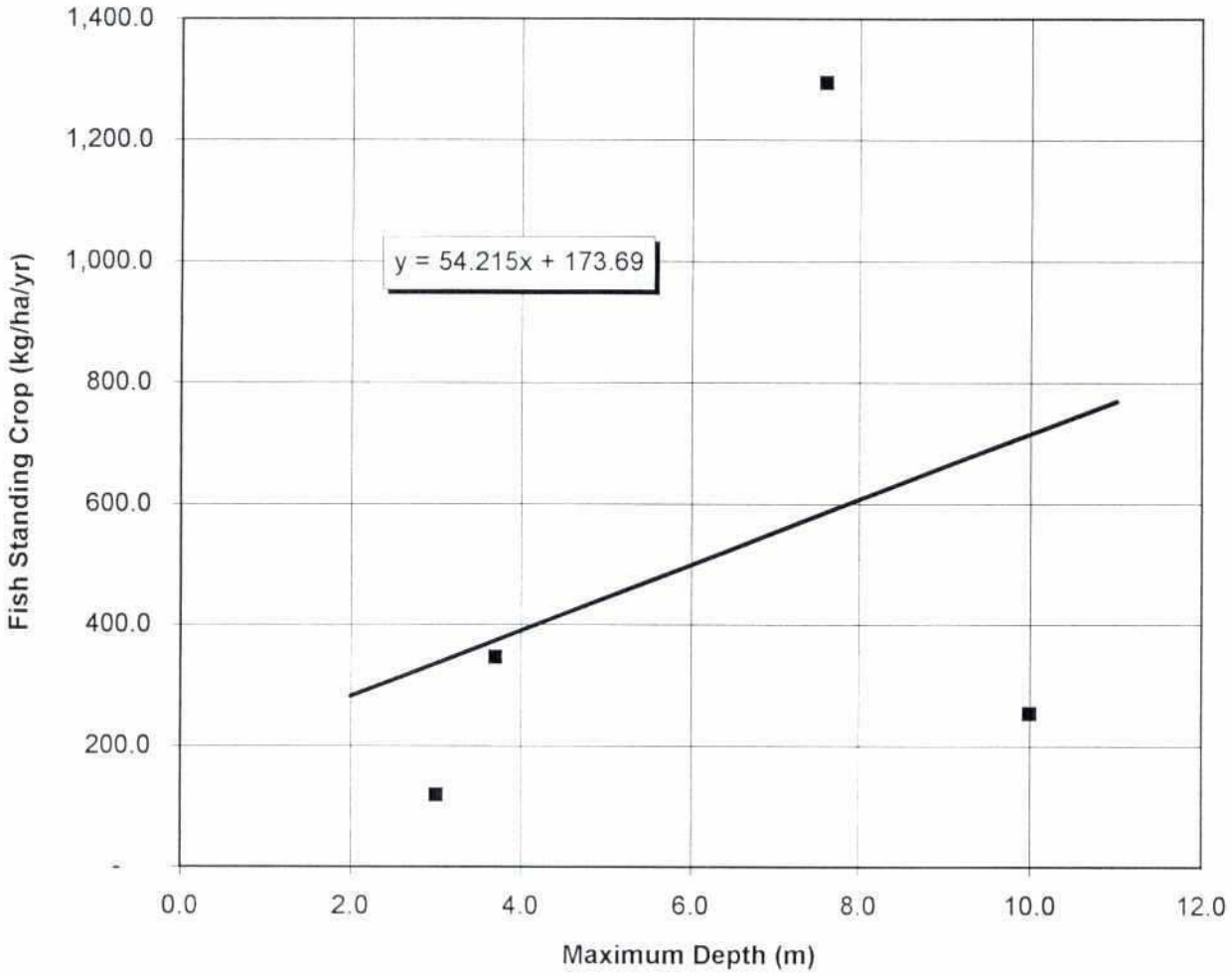


Figure H.55 Predicted Loss in Total Beel Area (For Future Without Project)

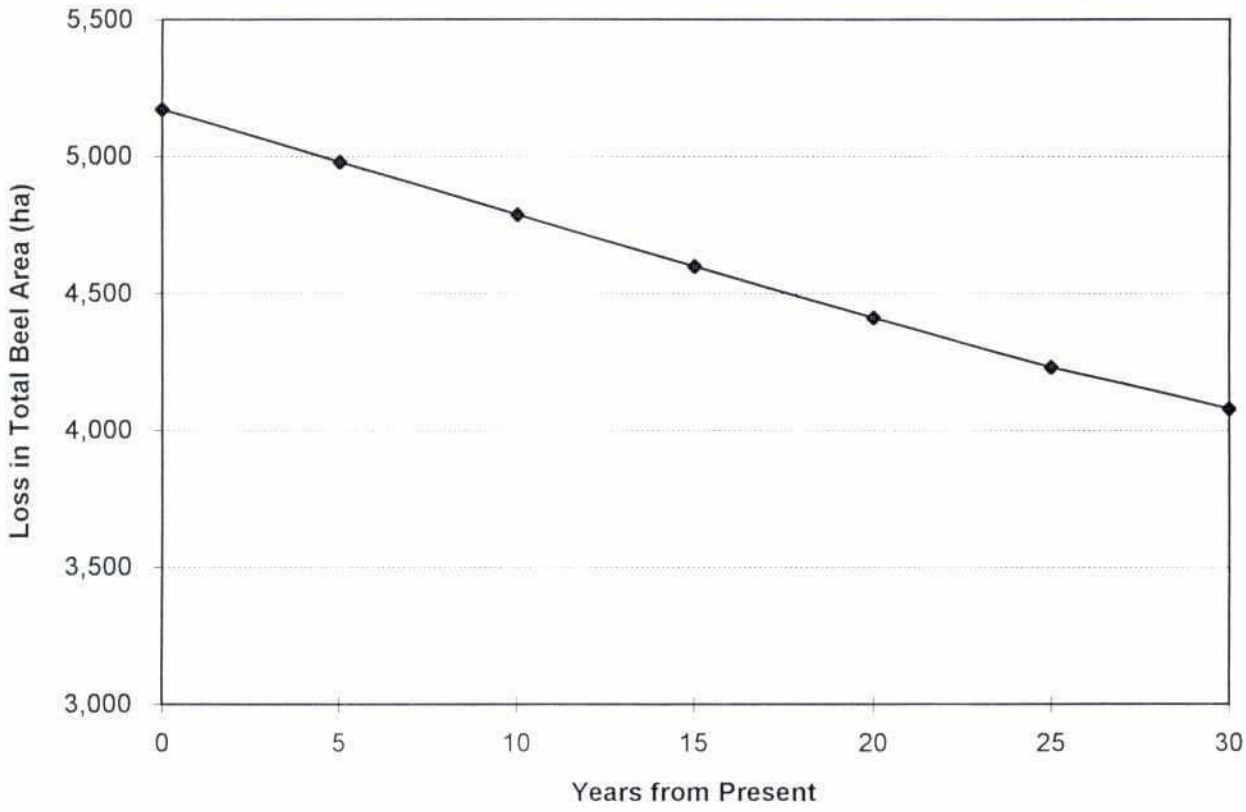
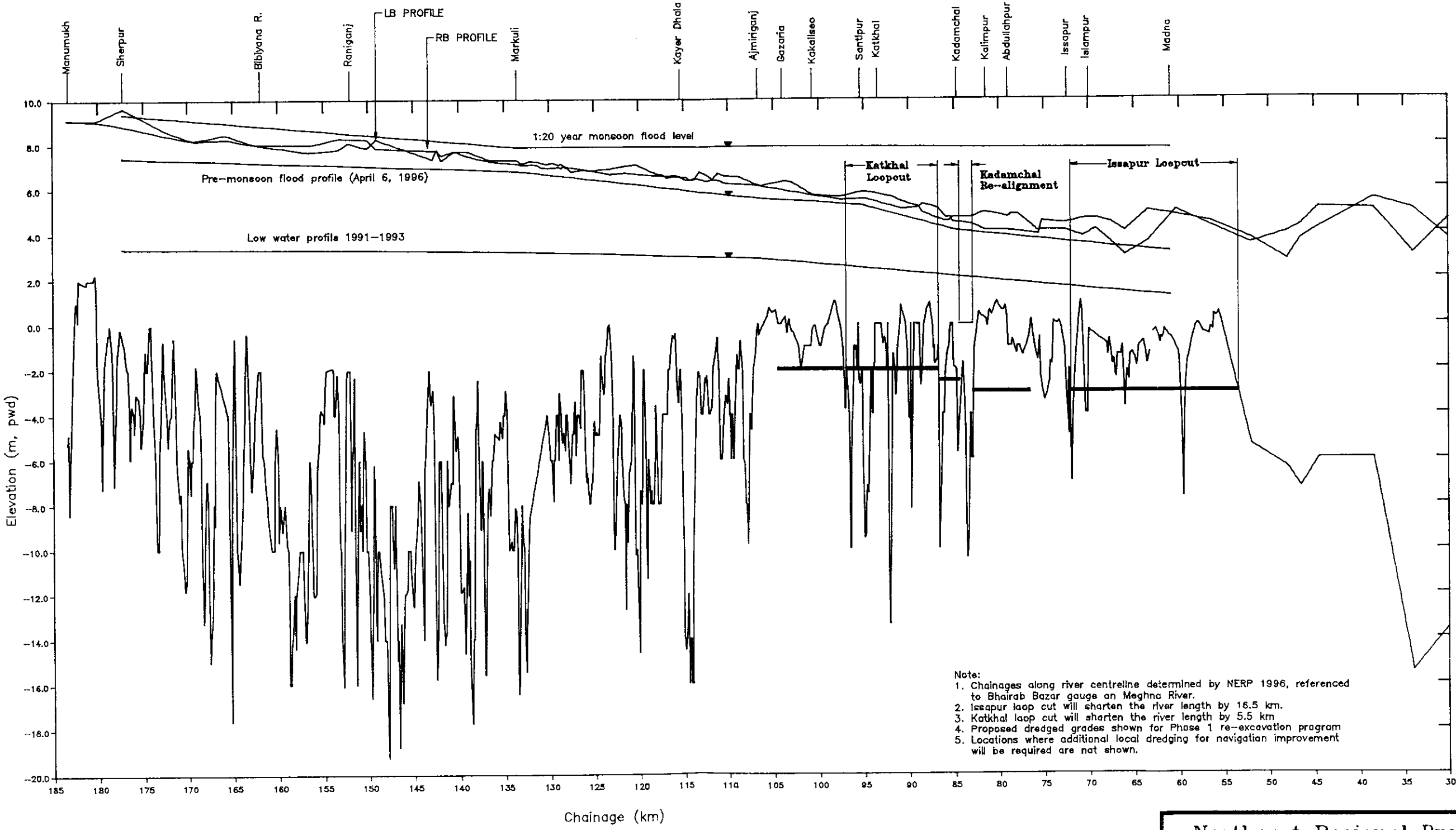


Figure H.56



Northeast Regional Project

Kalni-Kushiyara River Management Project

Longitudinal Profile of Kalni-Kushiyara River

Prepared by: D.G.M.	December 1997
Computer Drafting by: Mamun	

FILE: FISH-010.DWG

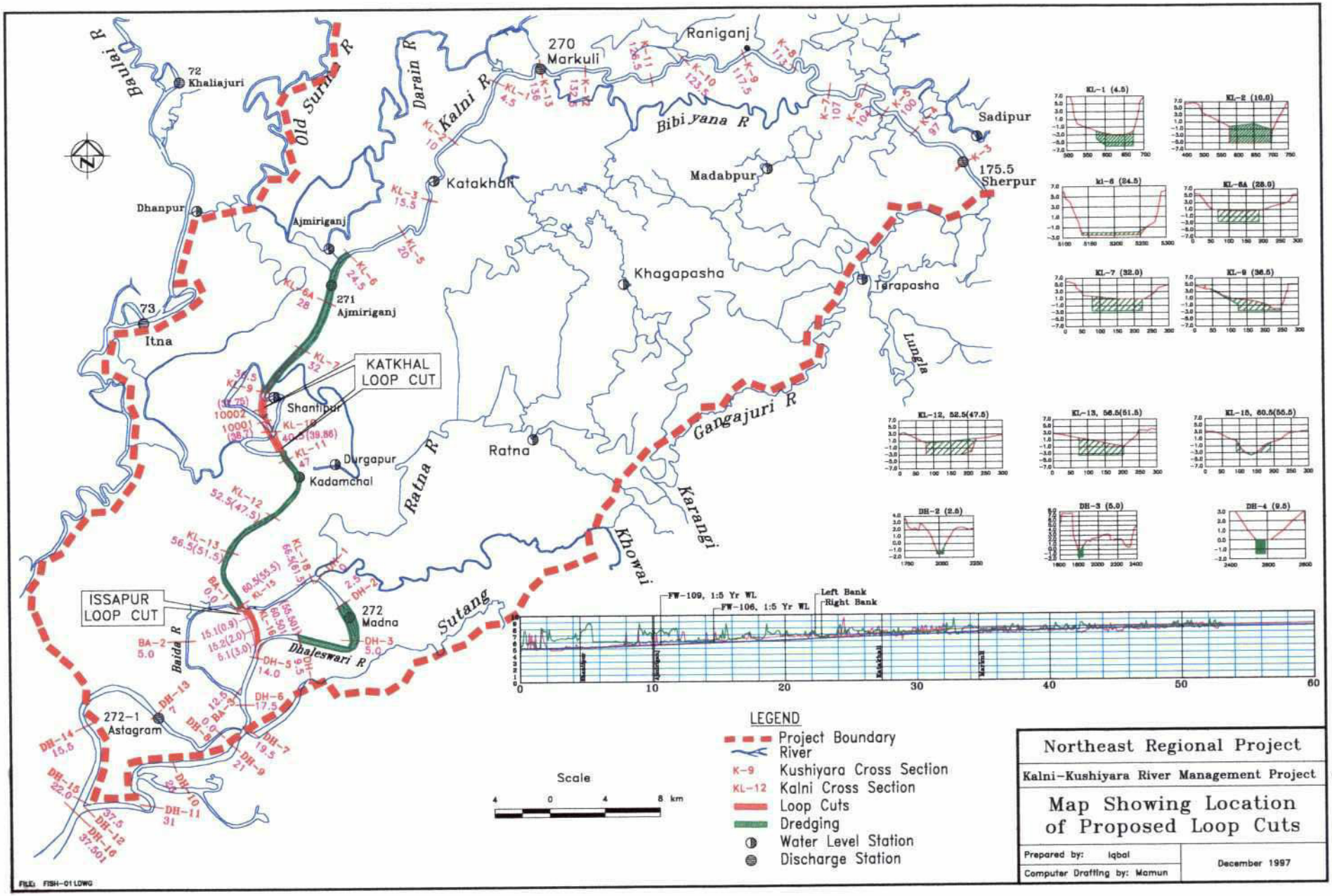
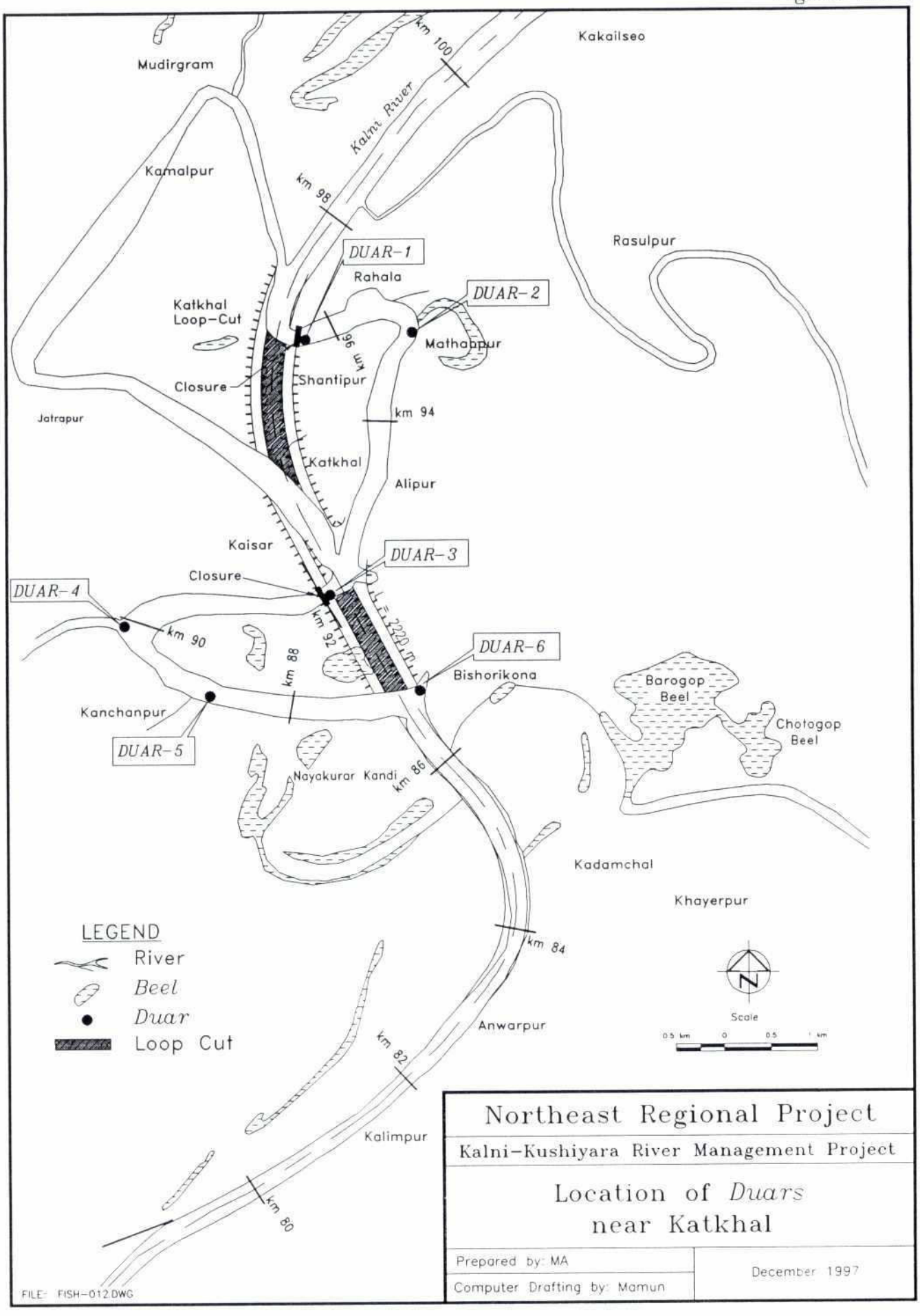

Baulai R
Old Surma R
Darain R
Kalni R
Bibiyana R
Gangajuri R
Ratna R
Lungla
Karangi
Khowai
Sutang
Baida R
Dhaleswari R
72
Khaliajuri
270
Markuli
Raniganj
Sadipur
175.5
Sherpur
Madabpur
Katakhali
Dhanpur
Ajmiriganj
271
Ajmiriganj
73
Itna
Khagapasha
Terapasha
KATKHAL
LOOP CUT
Shantipur
Durgapur
Kadamchal
Ratna
ISSAPUR
LOOP CUT
272
Madna
272-1
Astagram
N
Scale
4 0 4 8 km
LEGEND
Project Boundary
River
K-9 Kushiyara Cross Section
KL-12 Kalni Cross Section
Loop Cuts
Dredging
Water Level Station
Discharge Station
FW-109, 1:5 Yr WL
FW-106, 1:5 Yr WL
Left Bank
Right Bank
Northeast Regional Project
Kalni-Kushiyara River Management Project
Map Showing Location of Proposed Loop Cuts
Prepared by: Iqbal
Computer Drafting by: Mamun
December 1997
FILE: FISH-01.DWG

Figure H.57

Figure H.58



Northeast Regional Project	
Kalni-Kushiyara River Management Project	
Location of *Duars* near Katkhal	
Prepared by: MA	December 1997
Computer Drafting by: Mamun	

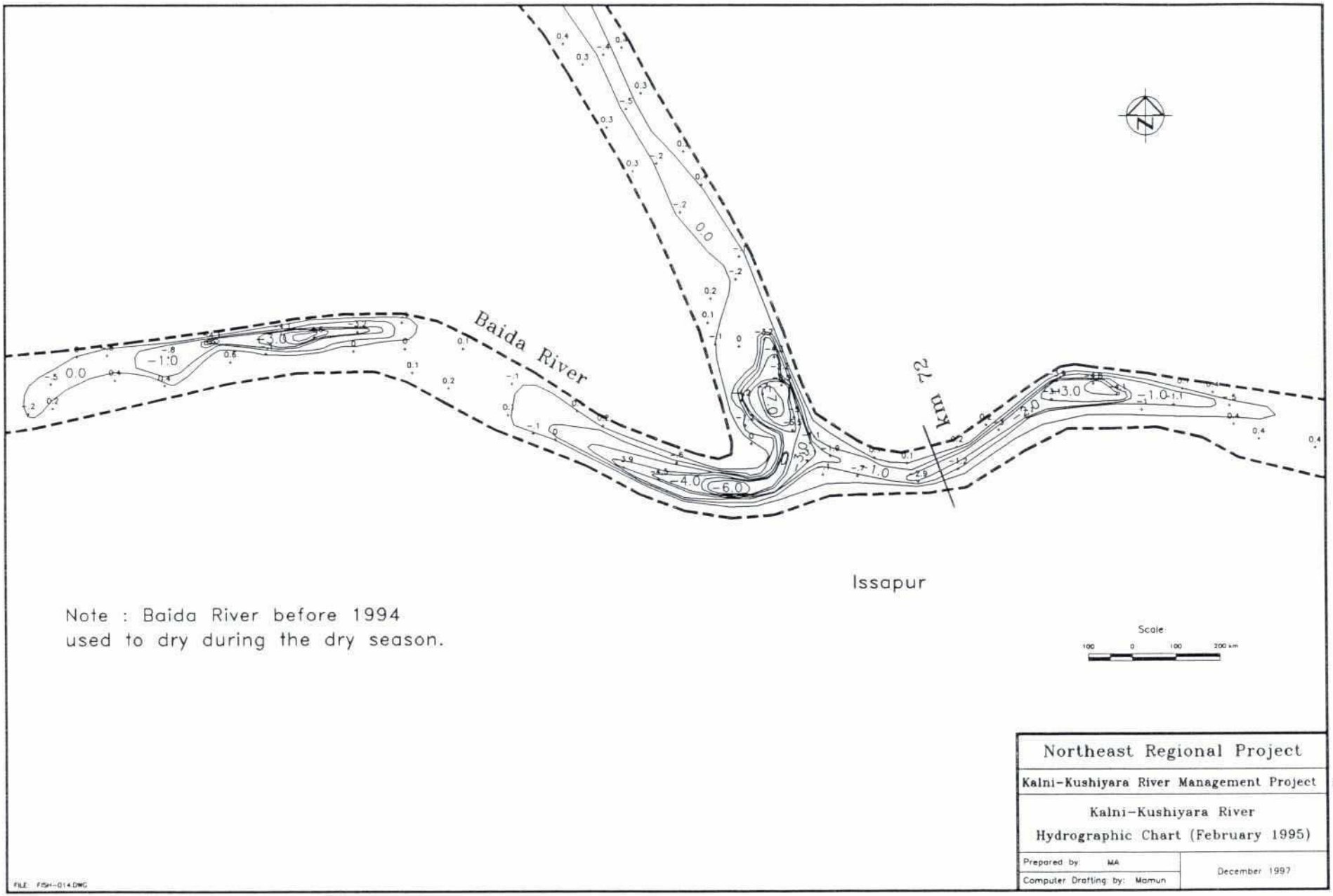

Baida River
72 km
Issapur
Note : Baida River before 1994
used to dry during the dry season.
Scale
100 0 100 200 km
Northeast Regional Project
Kalni-Kushiyara River Management Project
Kalni-Kushiyara River
Hydrographic Chart (February 1995)
Prepared by: MA
Computer Drafting by: Mamun
December 1997
FILE: FISH-014.DWG

Figure H.59

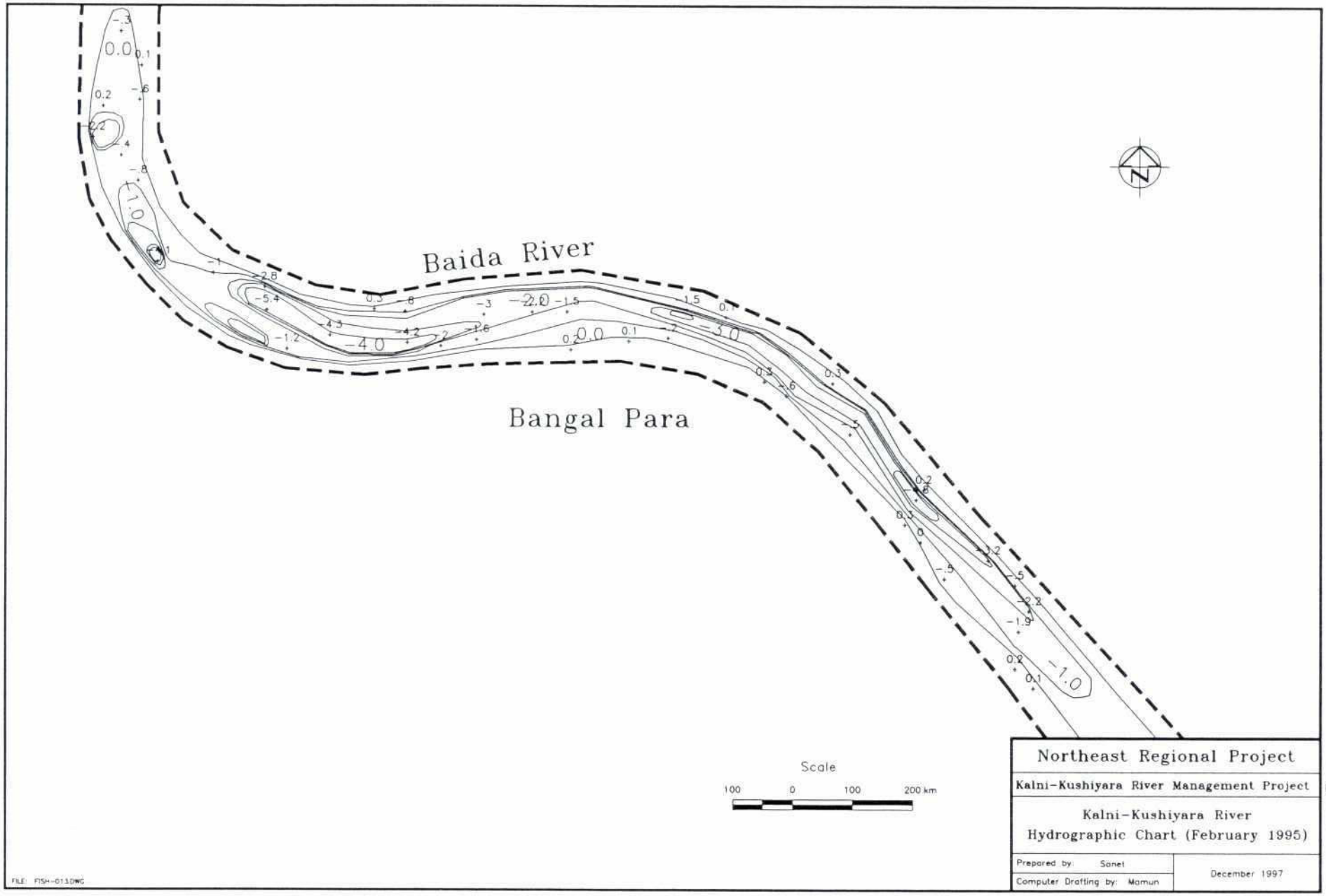

Baida River
Bangal Para
N
Scale
100 0 100 200 km
Northeast Regional Project
Kalni-Kushiyara River Management Project
Kalni-Kushiyara River
Hydrographic Chart (February 1995)
Prepared by: Sanet
Computer Drafting by: Mamun
December 1997
FILE: FISH-013.DWG

Figure H.60

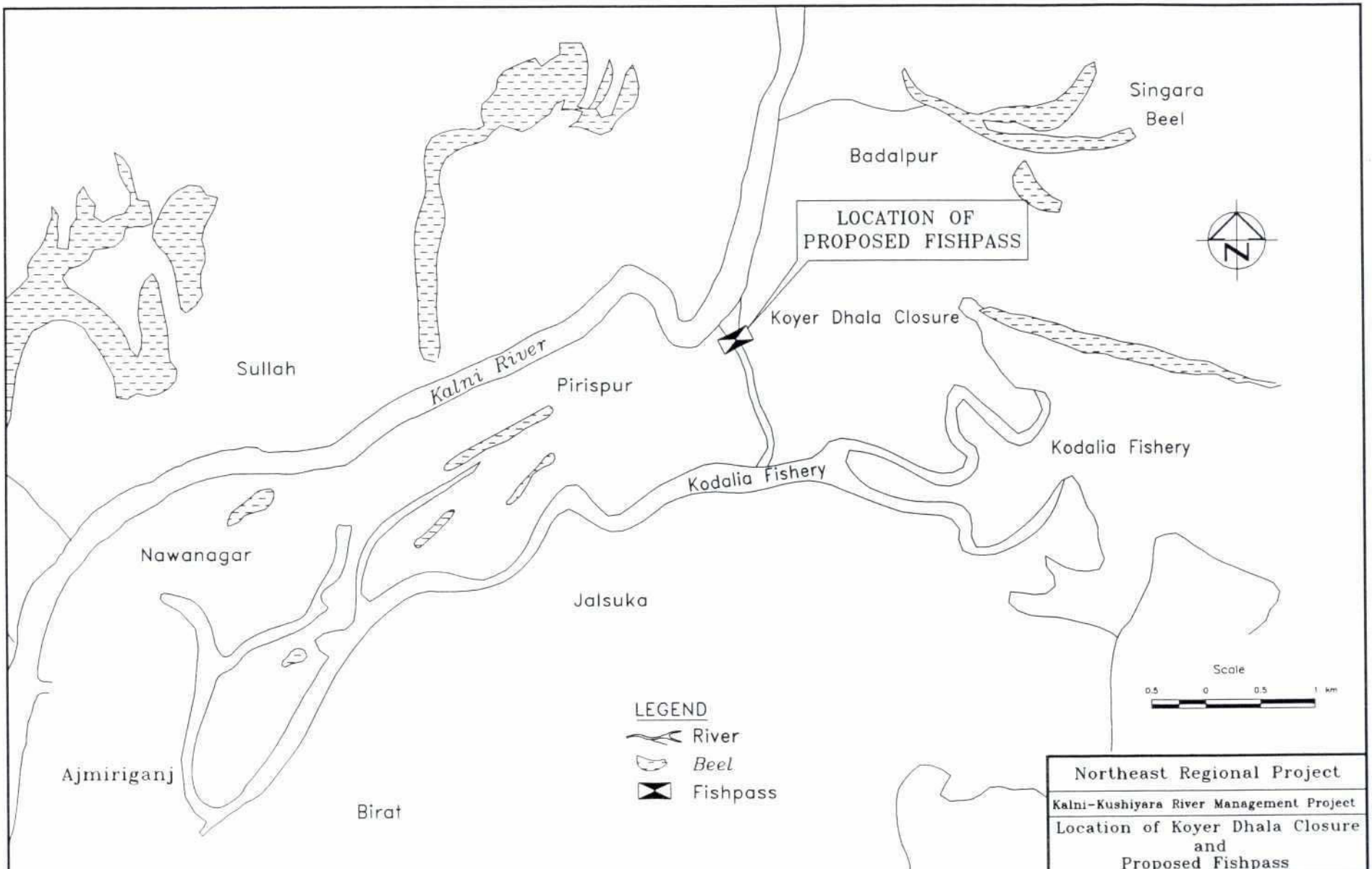
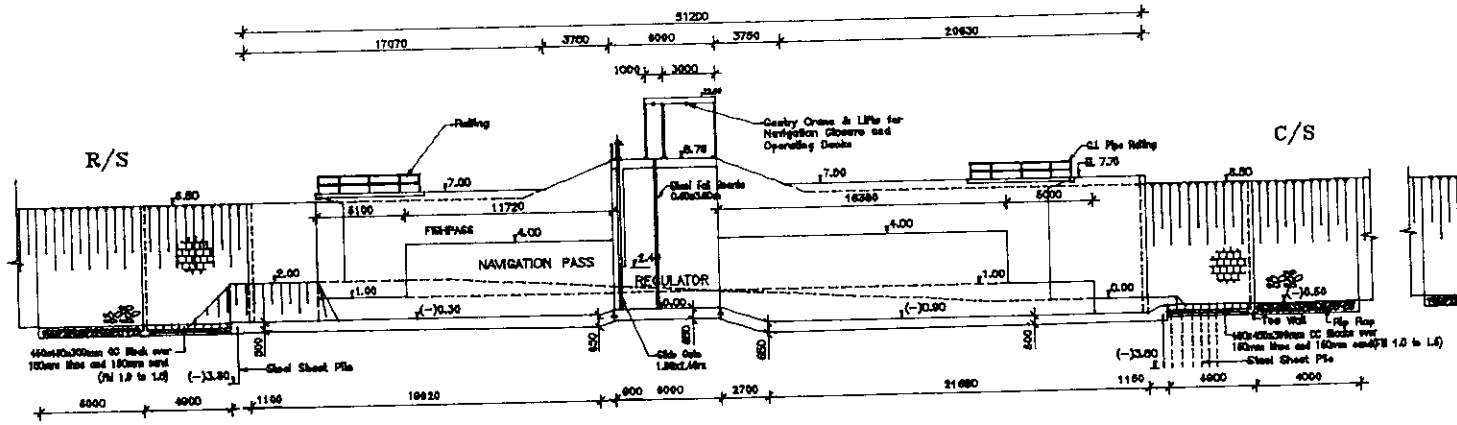

Singara
Beel
Badalpur
LOCATION OF
PROPOSED FISHPASS
N
Koyer Dhala Closure
Sullah
Kalni River
Pirispur
Kodalia Fishery
Kodalia Fishery
Nawanagar
Jalsuka
Scale
0.5 0 0.5 1 km
LEGEND
River
Beel
Fishpass
Ajmiriganj
Birat
Northeast Regional Project
Kalni-Kushiyara River Management Project
Location of Koyer Dhala Closure
and
Proposed Fishpass
Prepared by: Sonet
Computer Drafting by: Mamun
December 1997
FILE: FISH-015.DWG

Figure H.61

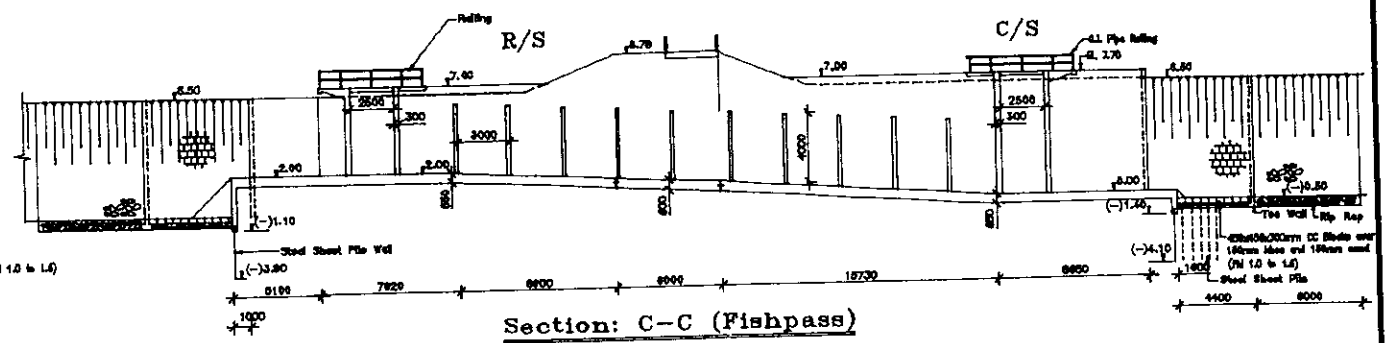
Figure H.62

216



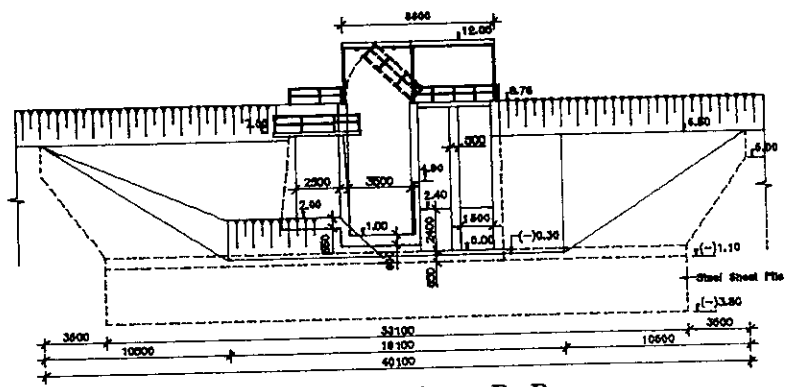
Section: A-A

Scale: 1:150



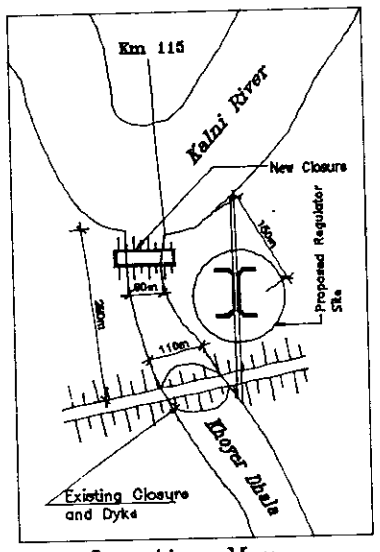
Section: C-C (Fishpass)

Scale: 1:100



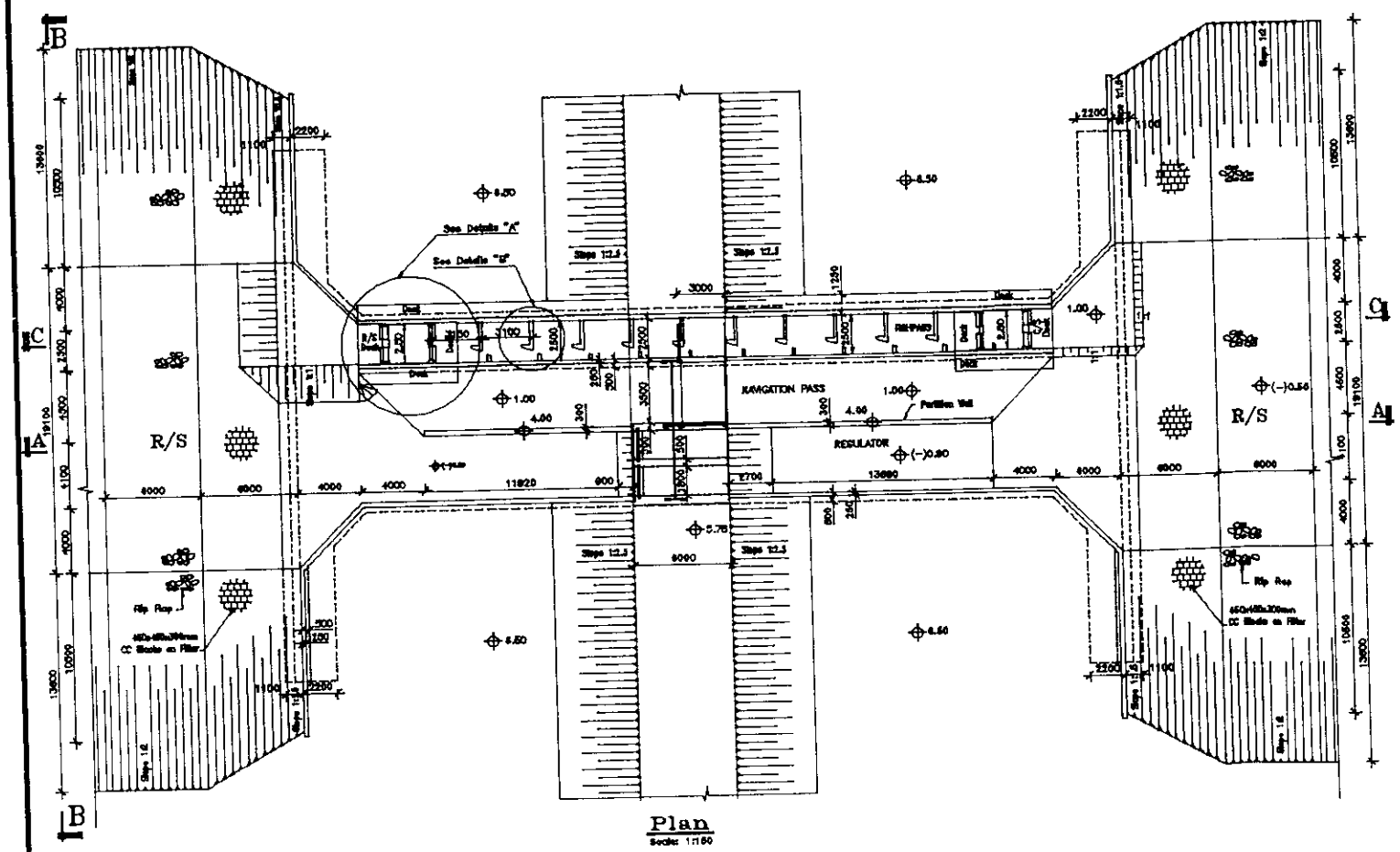
Section: B-B

Scale: 1:150



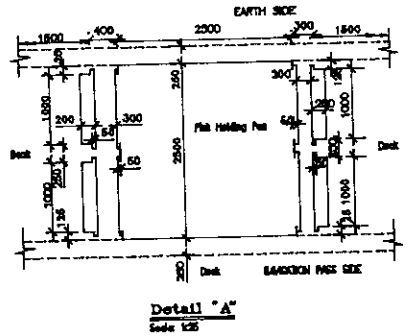
Location Map

Not to Scale



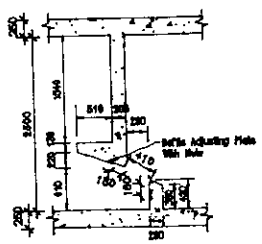
Plan

Scale: 1:150



Detail "A"

Scale: 1:25



Baffle and Pilaster Detail "B"

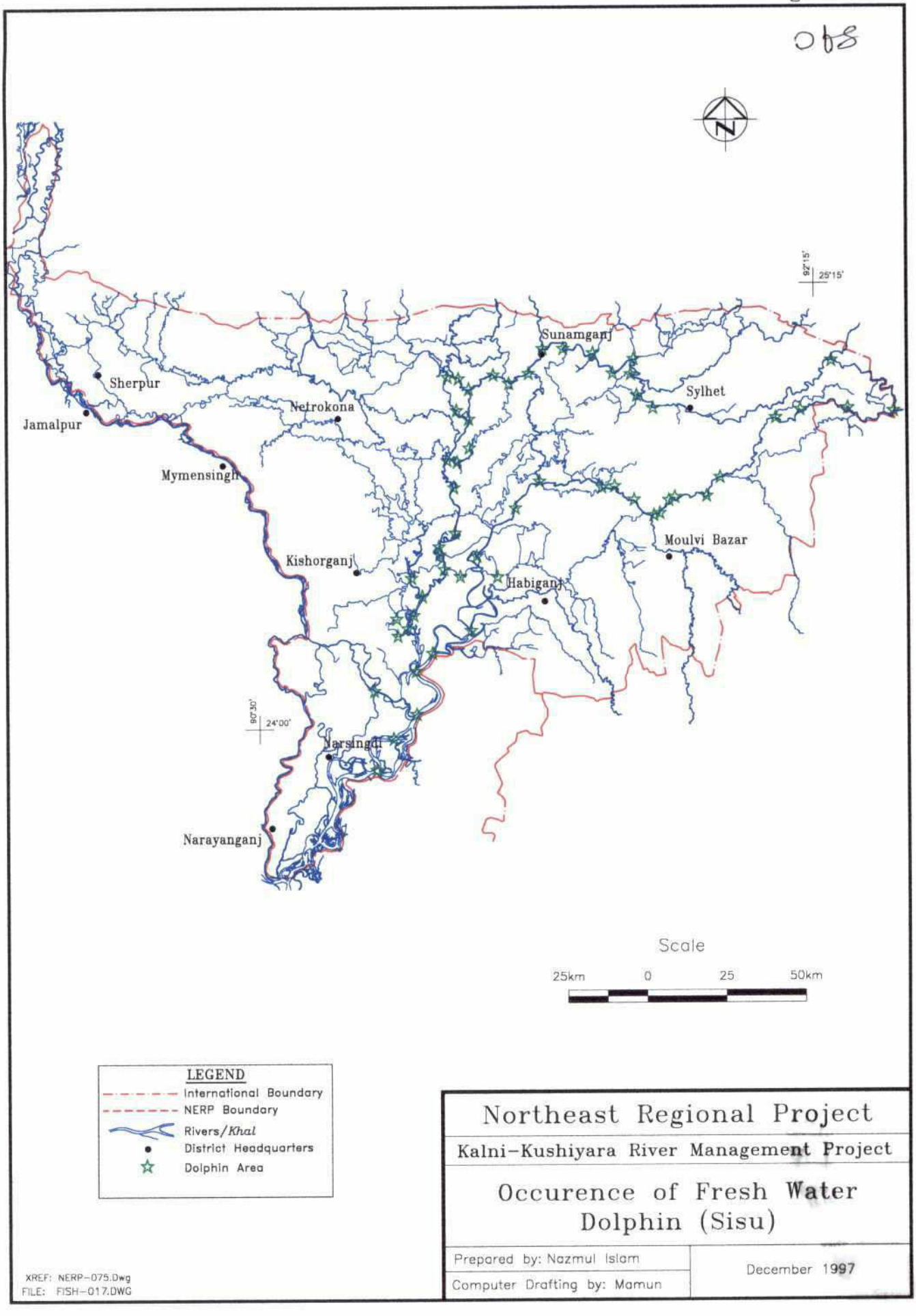
Scale: 1:25

Note: Dimensions are in mm
Elevations are in m PWD

Northeast Regional Project	
Kalni-Kushiyara River Management Project	
Koyer Dhala Multipurpose Regulator	
FL/DR Regulator-Fishpass-Navigation Pass	
Prepared by: HW/Salahuddin	April 1997
Computer Drafting by: Jalal	

FILE: MR-017A.DWG

Figure H.63



Northeast Regional Project	
Kalni-Kushiyara River Management Project	
Occurence of Fresh Water Dolphin (Sisu)	
Prepared by: Nazmul Islam	December 1997
Computer Drafting by: Mamun	

XREF: NERP-075.Dwg
FILE: FISH-017.DWG