Government of the Peoples Republic of Bangladesh
Flood Action Plan

FAP 17

Fisheries Studies and Pilot Project

FINAL REPORT

(Draft)

JUNE 1994

Supporting Volume No. 3

FISHERIES STUDY

CHATLA-FUKURHATI PROJECT

ODA
Overseas Development Administration, U.K.

FAP 17

FINAL REPORT

SUPPORTING VOLUME NO. 3

** Draft **

FISHERIES STUDY

Chatla-Fukurhati Project

A-13

FAP 17
FISHERIES STUDIES
AND PILOT PROJECT

June, 1994

Funded by ODA in conjunction with the Government of Bangladesh

TABLE OF CONTENTS

TABLE OF CONTENTS (Contd.)

LIST OF FIGURES

LIST OF FIGURES(Contd.)

LIST OF FIGURES(Contd.)

LIST OF TABLES

LIST OF TABLES (Contd.)

LIST OF TABLES (Contd.)

LIST OF TABLES (Contd.)

SUMMARY

1. The Chatla-Fukurhati Project was selected for study as a representative example of a partial flood control scheme. That the scheme did not provide the level of full flood control to which it was originally designed was due to inadequate maintenance and repair of regulators and embankments.

2. Andolir *Beel* was selected as a free-flooding control area. However, hydrological studies revealed that the area was less freely-flooded than floodplains within the FCD scheme and also more poorly drained. This was attributed to the development of a network of rural roads which provided unplanned partial flood control.

3. Since Andolir *Beel* did not function as a free-flooding control area, it was not possible to assess quantitative changes in flooding patterns within the scheme resulting from the construction of flood control embankments. However, several hydrological differences between sites inside and outside the FCD project were identified and these provided a rational basis for the interpretation of differences in fish populations between sites.

4. There was no difference in the timing of the first pre-monsoon rainfall floods or the start of the flood drawdown between sites inside and outside the FCD project. The magnitude of the pre-monsoon rainfall floods was about 0.5 metre lower than at sites outside the scheme because of a more efficient drainage system which also resulted in a more rapid flood drawdown in October. From mid-June to the end of November flood levels inside the scheme were 0.5 metre higher than those outside it due to a greater ingress of river floodwater. Therefore, a greater proportion of the monsoon flood originated from river flooding inside the FCD scheme. The duration of the flood was shortened by 2 to 4 weeks in December inside the scheme due to improved drainage.

5. Seasonal variations in water temperature, pH, dissolved oxygen concentration, conductivity and total dissolved solids were monitored in rivers, canals and floodplains inside and outside the FCD project. No major differences in water quality were detected on floodplains inside and outside the FCD project.

6. The annual catch per unit area of floodplains was 28% higher inside the FCD (142 kg/ha) than that outside (111 kg/ha). Seasonal patterns of catch were generally similar

inside and outside the FCD with most of catch (65% outside, 57% inside) being captured during November and December 1993. A slightly higher relative catch recorded outside the scheme (41% of annual catch) in December compared with that inside (37%) was related to the longer flood duration outside the scheme.

7. The annual catch per unit length of drainage canals for the period March 1993 to February 1994 was 36% higher inside the FCD (4,124 kg/km) than that from canals outside it (3,022 kg/km). Seasonal catch patterns were similar inside and outside the FCD; the bulk (60% outside, 51% inside) of the catch was taken in one month only, November 1993.

8. Statistical comparisons of seasonally pooled catch rates of several dominant gears excluding *kua* revealed no overall significant difference between fish densities from floodplains inside and outside the FCD scheme. The higher catch recorded inside the scheme was due solely to higher levels of fishing effort. For those gears included in the statistical analysis, total standardised effort measured in *current jal* hours per hectare was 8148 inside the FCD scheme compared with 3,618 outside it.

9. *Kua* contributed 41% and 42% of the total annual catch at sites inside and outside the FCD scheme. Statistical comparisons of the catch per unit area of similar-sized *kua* revealed no significant difference between fish densities from floodplains inside and outside the FCD scheme. The higher catch recorded from *kua* inside the scheme was due solely to the higher fishing effort measured in terms of the number of *kua* harvests.

10. No statistically significant difference was found between fish densities from canals inside and outside the FCD scheme. The higher catch recorded from the inside site was again due solely to higher levels of fishing effort. Total standardised effort, measured in *jhaki jal* hours per km, was 9,406 compared with 5,765 from the outside canal.

11. Slightly more fish species were recorded from annual canal catches inside the FCD scheme (63 species) than outside it (59 species). The difference in species diversity was more marked on floodplains where 38% more species were recorded from the annual catch inside the FCD scheme (80 species) than outside it (58 species).

12. Floodplain resident species dominated the annual catch from sites outside the FCD to a much greater degree than inside it (94% vs 70% by weight of the annual catch). Only 13 migratory or riverine species were recorded outside the FCD compared with 37 species inside the scheme. Migratory species comprised 3% of the catch by weight outside the FCD and 13% inside. The greater contribution to the catch by these species was attributed to increased ingress of river floodwaters compared to that on floodplains outside the FCD scheme. The blockage to fish migration in areas outside formal flood control embankments was in turn attributed to rural road construction projects typical of those supported by the Food for Work Programme.

13. The study identified *kua* as an extremely important fishing method used on floodplains inside and outside the FCD scheme. High species diversity retained by *kua* during winter months is a feature which enhances their potential conservation and management value as small-scale fish sanctuaries when left unfished during winter.

CHATLA-FUKURHATI FCD

1 STUDY AREA: BACKGROUND

The Chatla-Fukurhati Project is one of two flood control and drainage (FCD) schemes selected for study in the South West Region of Bangladesh, the other being the Satla-Bagda Project (Fig. 1.1). The results of fisheries studies on Satla-Bagda have been documented separately in Supporting Volume No. 2.

The Chatla-Fukurhati Project is a flood control scheme located between Faridpur and Madaripur. The scheme was compared with a control area of reportedly free-flooding land 20 km to the south lying immediately east of the town of Rajoir. The scheme covers an area of 12,100 ha and is bounded by 26 km of flood control embankment to the north and east, 9 km of metalled road in the south and 7 km of rail in the east (Fig. 1.2). The embankment was constructed in the late sixties to control flooding from Padma River and its tributaries the Arial Khan and Bhubaneswar with the aim of protecting the winter rice harvest. At the same time, canal excavation work was carried out to improve the drainage of *beel* so that a greater area of winter rice could be planted on low-lying land.

During the eighties the eastern embankment was raised but this did not prevent breaching and direct river flooding inside the scheme during the very high floods of 1988 when the Padma River overspilled its banks. During the period of the present study (1993-1994), two breaches remained in the eastern embankment but their effect on flooding of the lower-lying central region of Chatla *Beel* was reduced by a continuous line of village roads forming embankments running north-south inside the scheme. On the northern embankment, gates of the two largest regulators failed to operate due to lack of maintenance and this allowed entry of floodwaters from the Bhubaneswar River to the western part of the scheme. Despite embankment breaches and ineffective regulators, local farmers and fishermen reported that the embankments and canal excavation work had not only delayed floods but reduced their extent, depth and duration.

The scheme was therefore selected for study as a representative example of partially functioning FCD projects. A broader survey undertaken as part of the initial scheme selection process revealed that most FCD schemes in this part of the South West Region did not provide the level of flood control for which they were designed principally because of embankment breaching or inadequate maintenance of regulators.

The control area is bordered in the east by the Arial Khan River and in the north and west by the Kumar River, a distributary of the Arial Khan (Fig. 1.3). The absence of flood control embankments along the Kumar immediately to the north of the floodplain sampling sites allowed entry of floodwaters by direct overbank spillage. In addition, a series of canals transported floodwaters from both northern and eastern arms of the Kumar onto the adjacent floodplains. Extensive village development in the control area resulted in the construction of numerous inter-connecting village roads which served as partial or full-flood control embankments depending on their height and the presence of drainage culverts.

Figure 1.1 Location of study areas within the South West Region

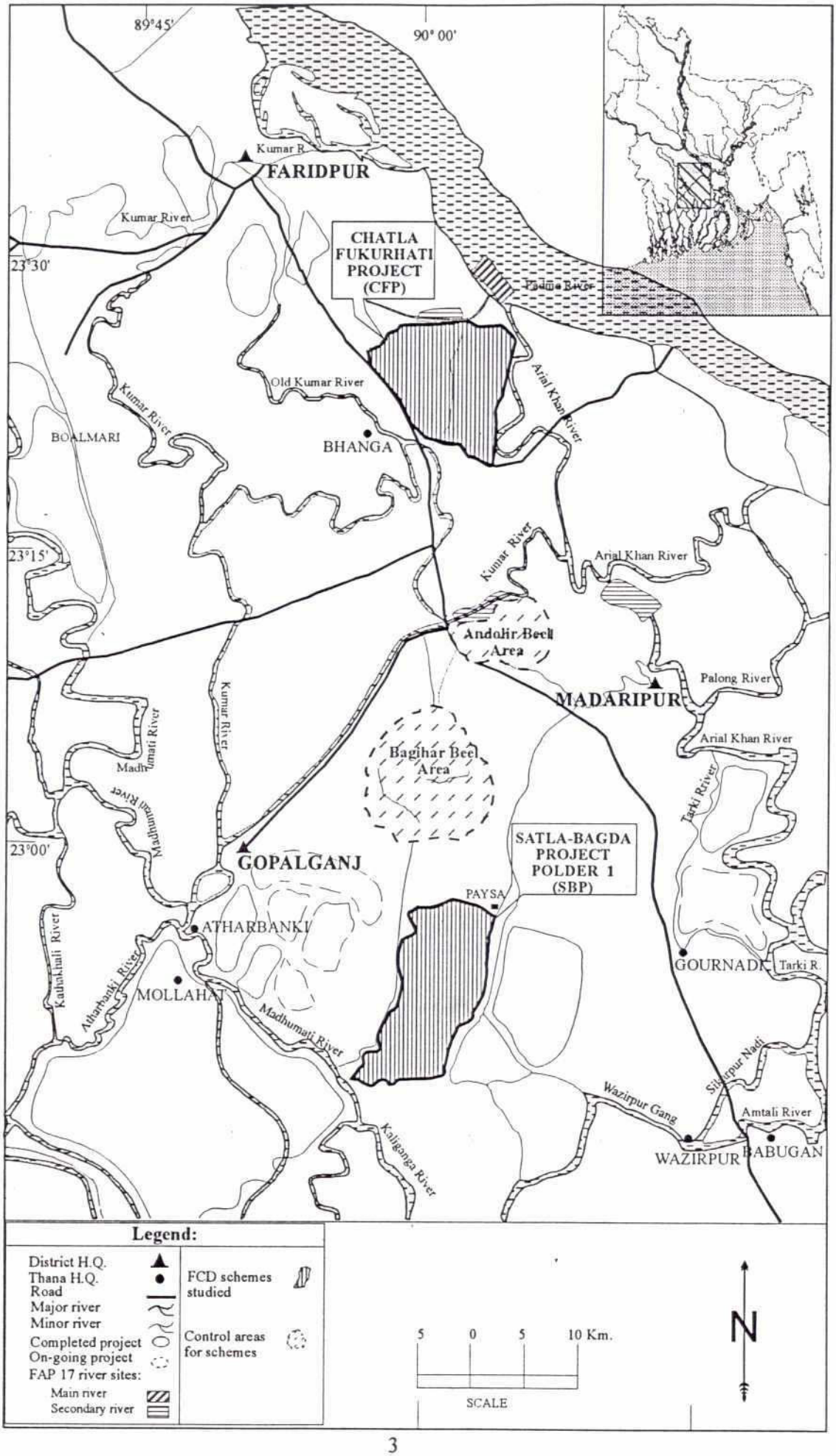


Figure 1.2 Location of sampling sites in the Chatla-Fukurhati Project

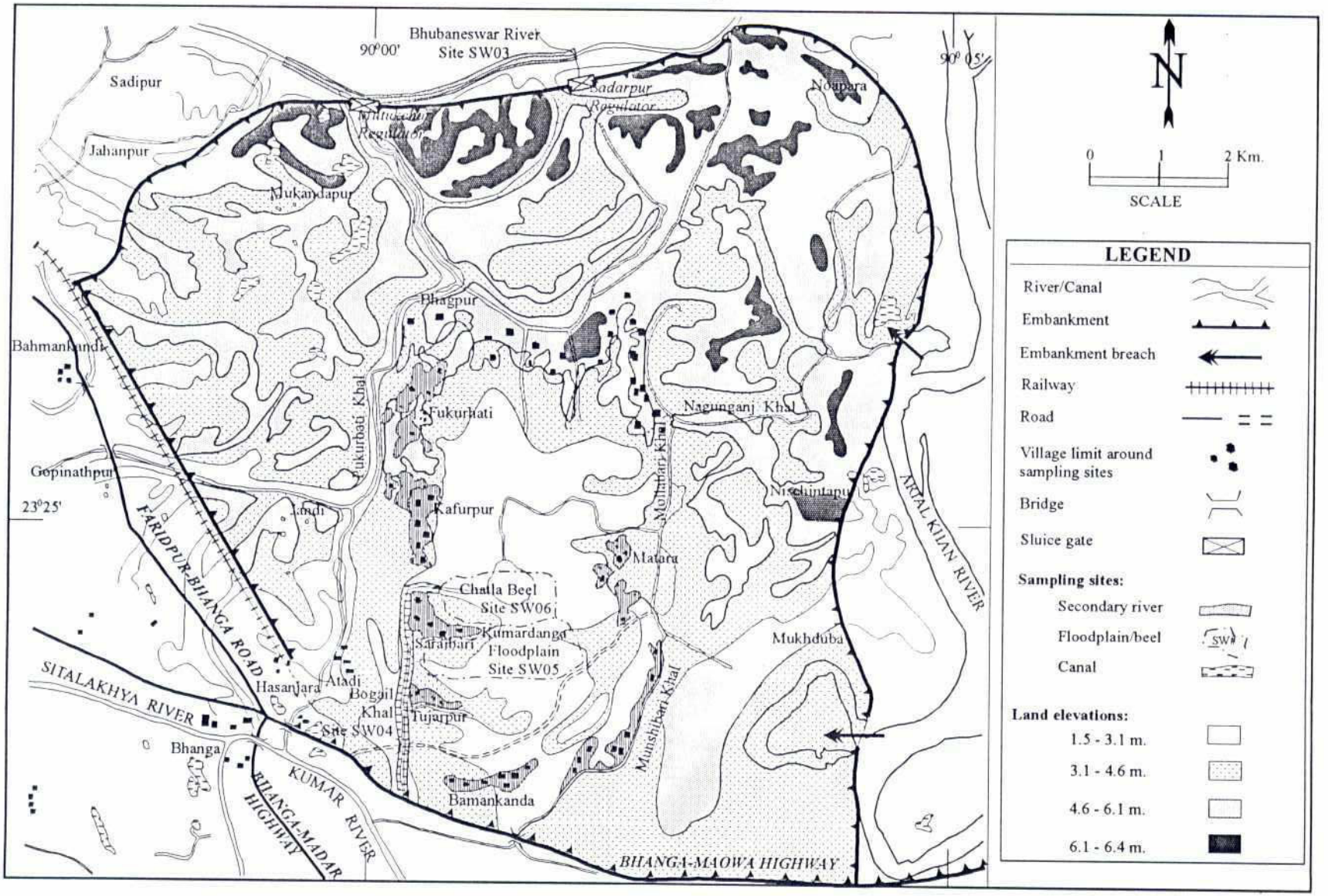
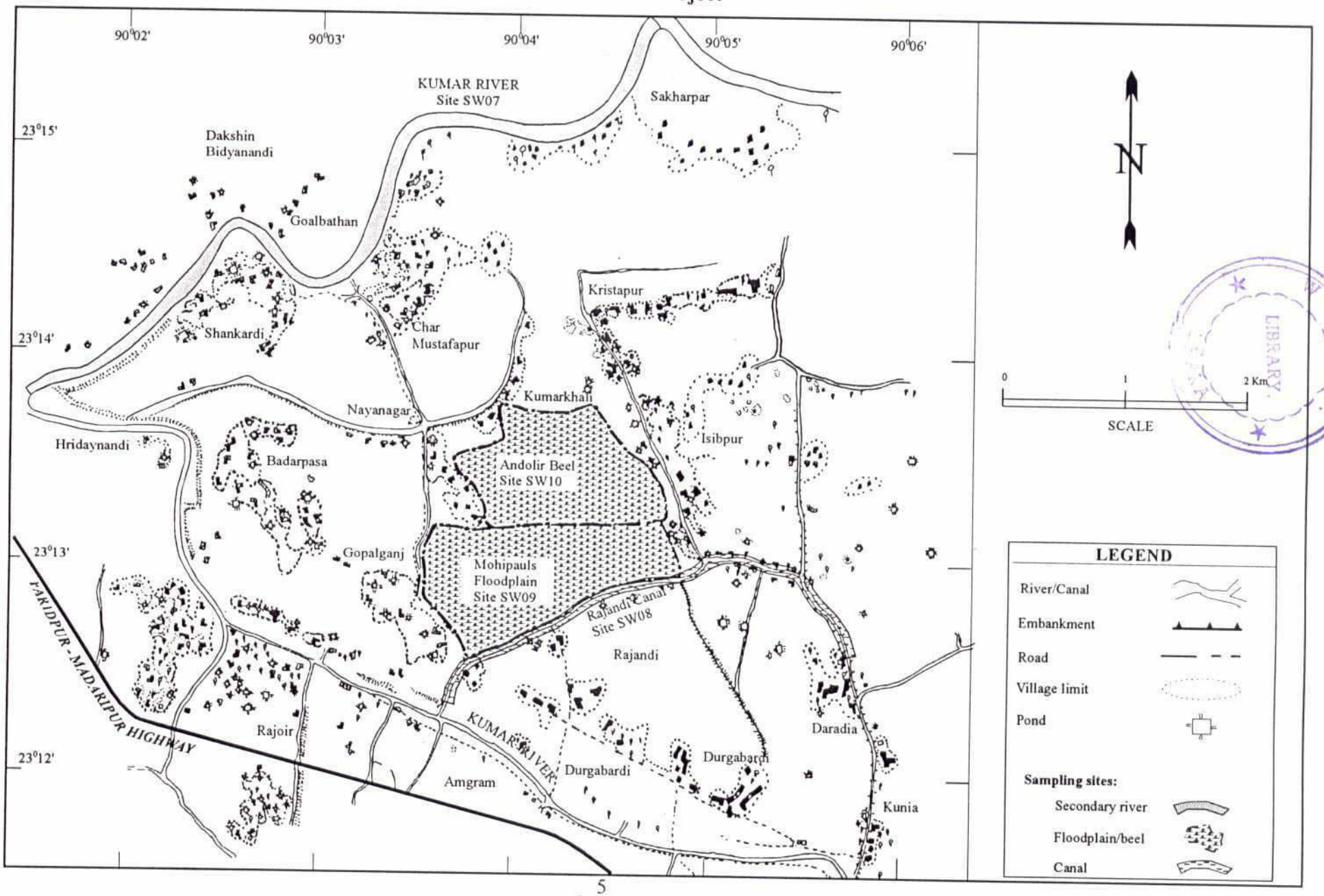


Figure 1.3 Location of sampling sites outside the Chatla-Fukurhati Project



2 DESCRIPTION OF SAMPLING SITES

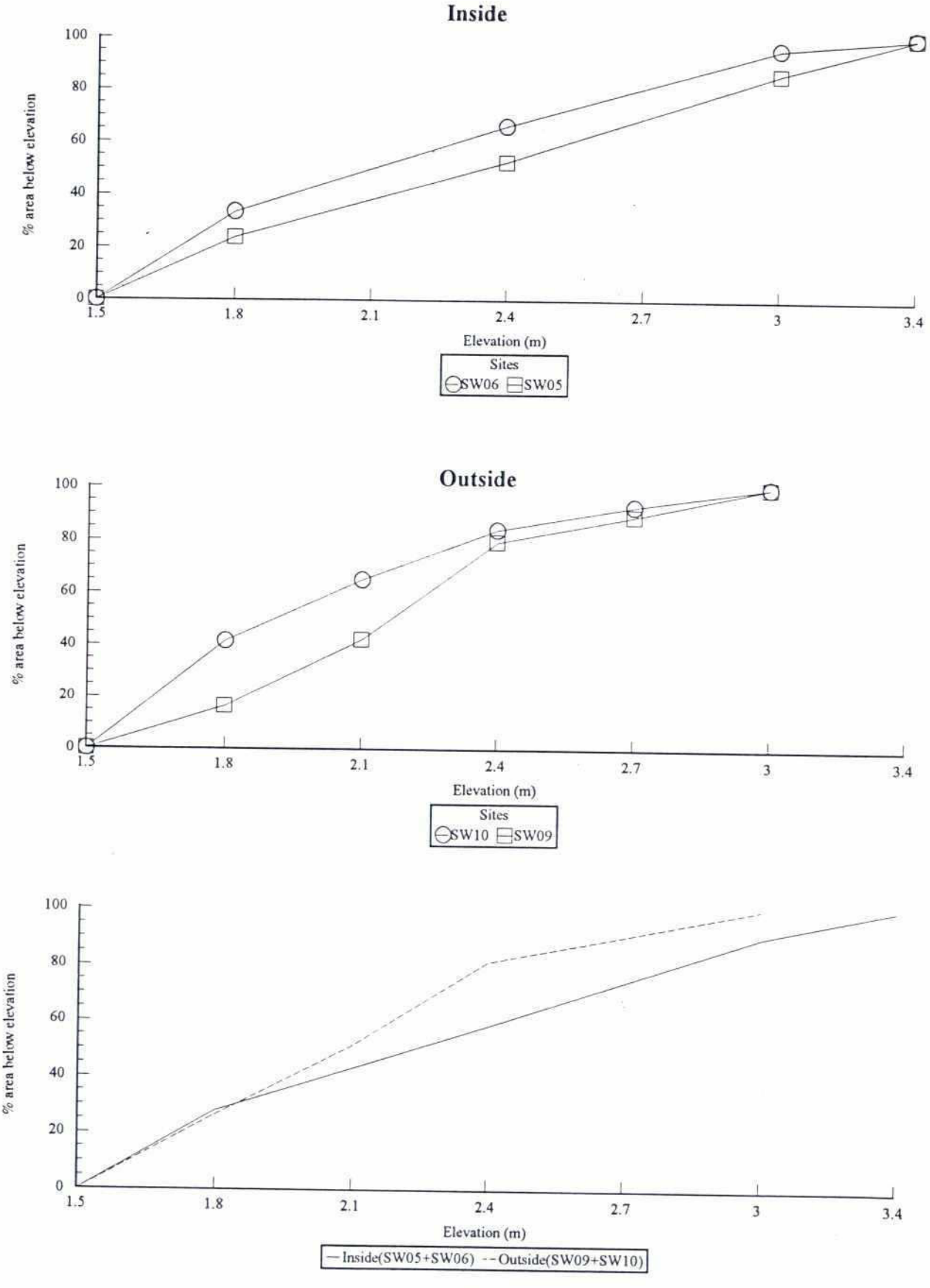
Two floodplain sites (SW05 and SW06) were selected inside the scheme and two outside it (SW09 and SW10) covering total sampling areas of 302 ha and 292 ha respectively (Table 2.1). Land types defined in terms of agro-ecological units were similar at sites inside and outside the scheme indicating similarities in the historical distribution of soil types, land heights, flooding patterns and agricultural capabilities (see Supporting Volume No. 15 for further details). Sites inside the scheme were located on a fairly extensive central low-lying area known as Chatla *Beel*. This area was surrounded by higher and therefore less deeply flooded land within the scheme (Fig. 1.2). Area elevation curves were constructed for each site from topographical maps using electronic planimetry (Fig. 2.1). The range of land heights at the two inside sites was identical (1.5-3.4 m PWD), however site SW05 comprised a greater proportion of slightly higher land than its neighbouring site SW06 (Fig. 1.2).

Table 2.1 Description of sampling sites

Site code	Site name	Habitat	In/Out FCD	Size	
				Area (ha)	Length (km)
SW01	Padma River	Main River	Out	1256	8.20
SW02	Arial Khan River	Secondary River	Out	317	10.55
SW03	Bhubaneswar River	Secondary River	Out	27	5.40
SW04	Bogail *Khal*	Canal	In	4	3.73
SW05	Kumardanga Floodplain	Floodplain	In	172	
SW06	Chatla *Beel*	*Beel*	In	130	
SW07	Kumar River	Secondary River	Out	134	13.35
SW08	Rajandi *Khal*	Canal	Out	6	4.69
SW09	Mohipauls Floodplain	Floodplain	Out	181	
SW10	Andolir *Beel*	*Beel*	Out	111	

Both sites were located on land sufficiently low to provide the opportunity for the development of winter fisheries based on fish pits (*kua*) excavated on the floodplain to attract and trap wild fish. During the winter both sites supported extensive crops of HYV rice with some mustard which were planted during the last two weeks of November and early December. During the monsoon each site supported a mixture of a little jute grown on the highest land adjacent to villages, deep water *aman* on land of intermediate elevations and

Figure 2.1 Area elevation curves of floodplain sites inside and outside the Chatla-Fukurhati Project



open-waters with dense rooted macrophytic vegetation and only a few sporadic patches of water hyacinth.

Floodplain sites outside the scheme covered approximately the same range of land heights (1.5-3.0 m) as those inside. Area elevation curves indicated that site SW10 contained relatively more lower land than SW09 and that both were a little lower than inside sites (Fig. 2.1). Seasonal changes in the distribution of agricultural crops and aquatic macrophytic vegetation were very similar to those observed at sites inside the scheme. During the monsoon a small area of jute remained on higher ground next to villages whilst deep water *aman* was planted on intermediate elevations and the deeper areas supported a variety of rooted macrophytic plants in open waters which were largely free from water hyacinth. During the winter the whole floodplain was used for HYV rice and, to a lesser extent, mustard.

Canals linking floodplain sites to adjacent rivers were also monitored inside and outside the FCD scheme (Table 2.1). A 3.7 km stretch of Bogail *Khal* was sampled which drained sites inside the Chatla-Fukurhati scheme and emptied into the Kumar River (Fig. 1.2). Outside the FCD scheme, a 4.7 km stretch of Rajandi *Khal* was sampled which drained floodplain sites and emptied into another arm of the Kumar system (Fig. 1.3). The canals were of similar size with average widths of 11.7 m and 13.0 m for Bogail and Rajandi respectively. However, the flow in Rajandi *Khal* was impeded more than that in Bogail *Khal* and this was caused by the build up of dense packs of water hyacinth which prevented fishing in some stretches between May and July 1993.

Sampling sites were also selected on a series of linked rivers which connected with floodplain sites inside and outside the scheme. These sites were selected to provide information on the movement of fish between river and floodplains. Sampled rivers included the Padma and its distributaries the Arial Khan and the Bhubaneswar and also the Kumar River, a distributary of the Arial Khan River (Fig. 1.1). The Arial Khan and Kumar Rivers flow throughout the year whereas the Bhubaneswar is highly seasonal, drying completely during the winter. Descriptions of the riverine sites have been presented previously in Supporting Volume No. 2.

2A

3 HYDROLOGY

At each floodplain site water depths were measured every two weeks at fixed points on different land heights so that a range of water depths was sampled. At the same time, the extent of the flood was recorded on sketch maps and points of entry and exit of floodwaters were noted together with the direction of water flow in feeder and drainage canals associated with each site.

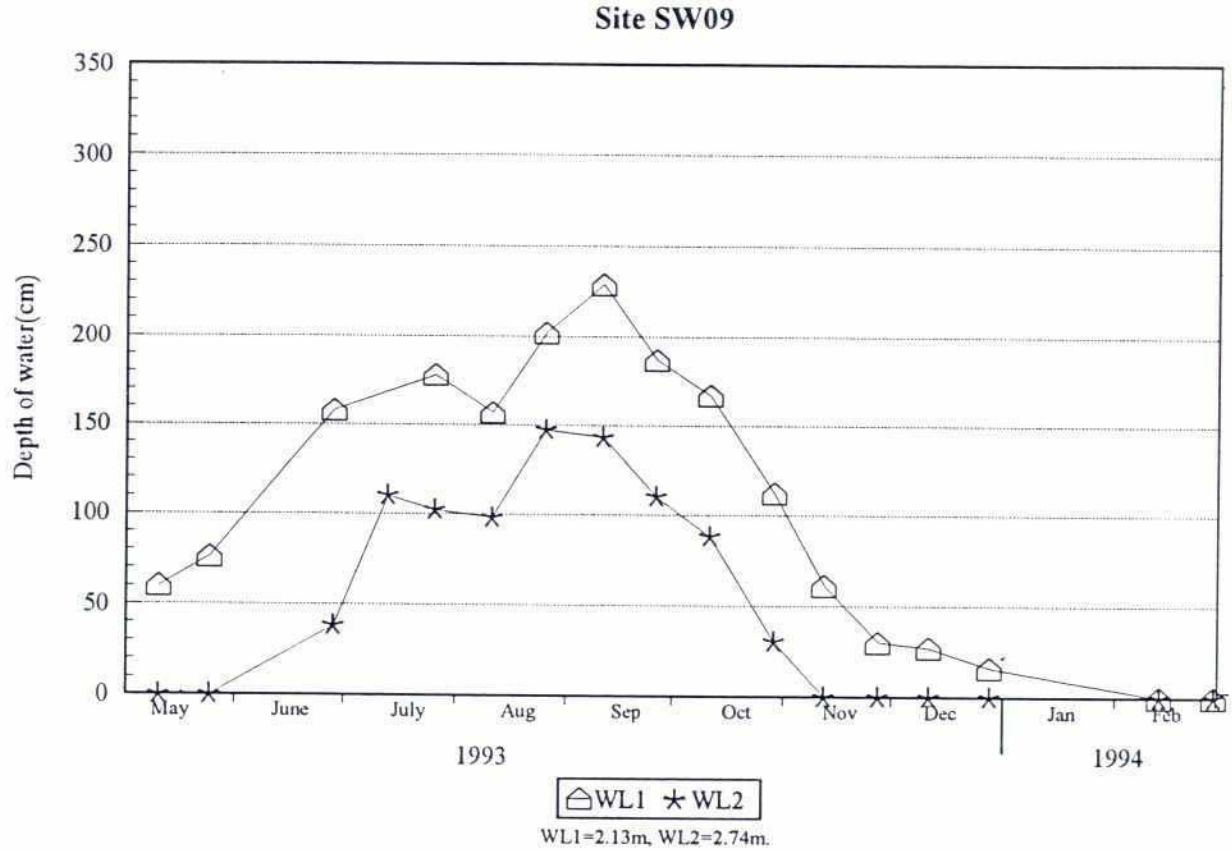
3.1 Outside the Scheme

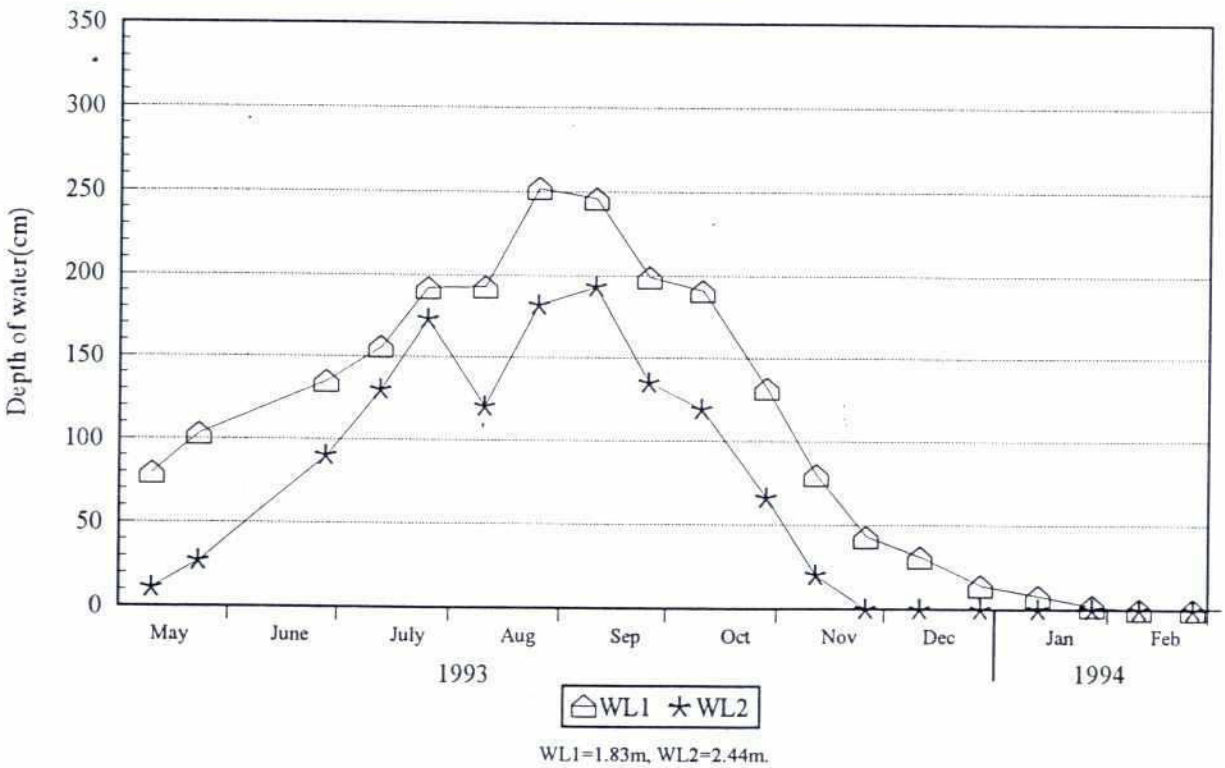
During 1993 the first flooding of floodplain sites occurred in early April following persistent heavy rainfall during late March which was preceded by unusually early rains in February. No measurements of water depth were taken in April but field reports made during fisheries surveys revealed that site SW09 remained dry whilst some pools of shallow water accumulated on site SW10 although little fishing activity was observed. During May rainfall flooding increased and by the end of the month about 60% of the area of site SW09 was submerged and 80% of SW10. At this time the maximum water depth was about one metre (Fig. 3.1). Rainfall flooding continued up to mid-June when river levels rose and the direction of water flow in canals to the west reversed, thus bringing the first river floodwaters on to the floodplain. Tidal influence was relatively small in winter and negligible during the monsoon.

River levels continued to rise in July when sites were completely submerged and again in August resulting in increased ingress of river water via canals on the western and northwestern site boundaries. About 3 km to the north and northwest of the sites, the Kumar River overspilled its banks in areas unprotected by village roads and flood control embankments. However, the southerly flow of these floodwaters was impeded by a network of village roads surrounding the sampling sites. Roads to the north were eroded in places allowing some entry of floodwaters from Kumar. No floodwater directly flowed into the sites from either canals or overbank spillage from the Arial Khan River lying 7 km to the east of the sites.

Flooding reached a peak between late August and mid-September when a maximum depth of 2.5 m was recorded in low-lying areas (Fig. 3.1). During this period the sampling site on Rajandi *Khal* which formed the southern boundary of site SW09, overspilled its northern bank onto the floodplain. From late September to the end of November, as river levels

Figure 3.1 Seasonal variation in water depths at different land elevations on floodplains outside the Chatla-Fukurhati Project





WL = Land elevation (m) at positions of depth measurement.

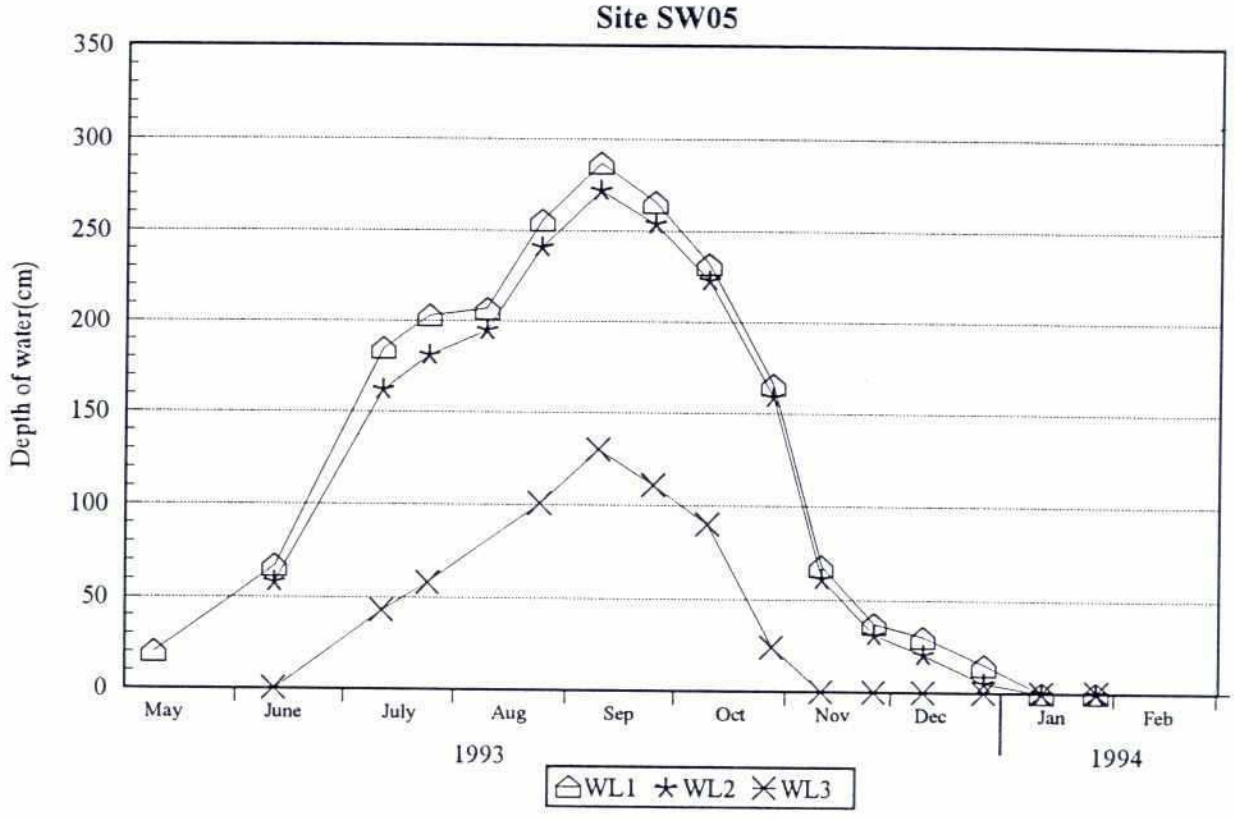
decreased, floodwaters drained from the floodplain via canals. Later, during the winter months (December -January) when connections with canals were lost, further reductions in residual water resulted from seepage and evaporation until the only waterbodies which remained on the floodplain sites were man-made *kuas*. In January and February winter rice paddies received additional water from tubewell irrigation. These fields were not used for supplementary capture fisheries.

3.2 Inside the Scheme

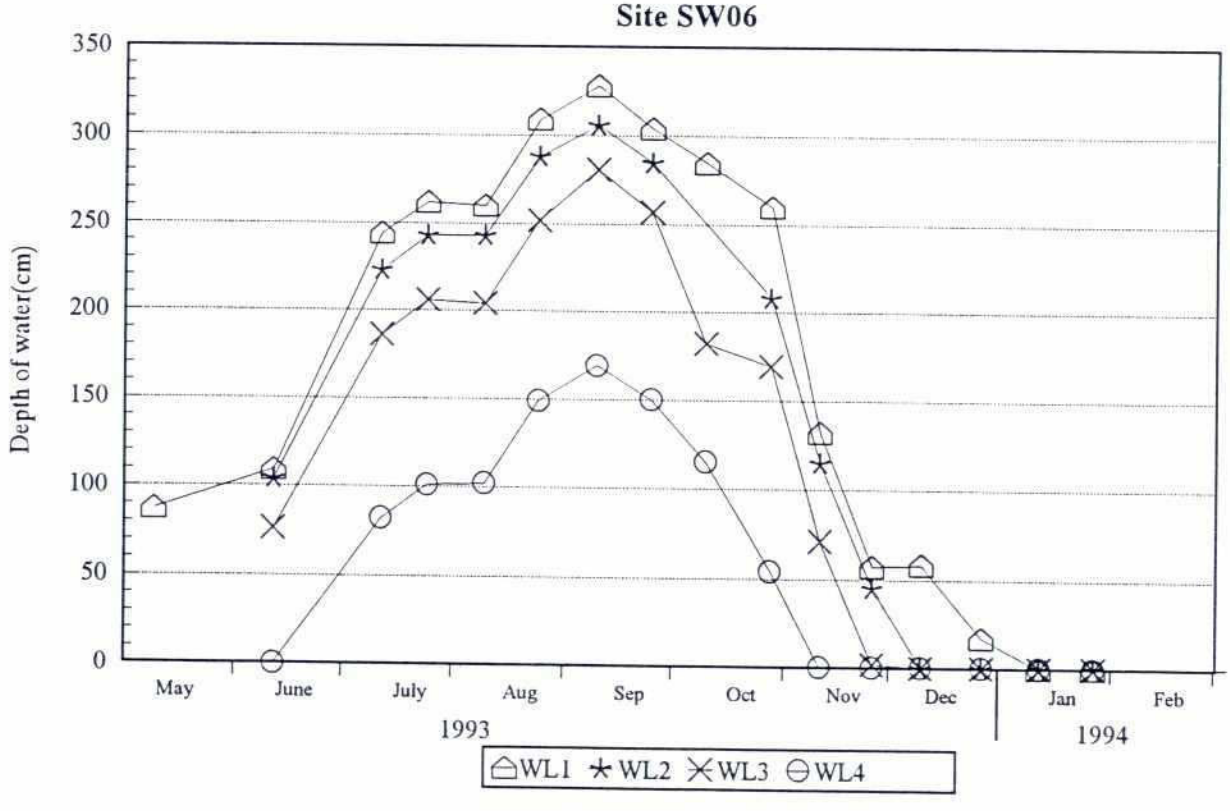
Initial measurements of water depth taken in early May 1993 indicated that the first rainfall flooding almost certainly occurred in April despite the absence of fishing activities at that time. Water depths resulting from rainfall flooding inside the scheme during May were approximately 0.5 m lower than those on floodplain sites outside it (Figs. 3.1 and 3.2). The difference could be attributed to a more efficient drainage system within the scheme. Between mid-June and early July, flood levels increased rapidly coinciding with a sharp rise in water levels of the Padma River (Fig. 3.3) which fed the Arial Khan and Bhubaneswar rivers running along the eastern and northern boundaries of the scheme. Floodwaters from the Bhubaneswar first entered the scheme in mid to late June via two large open regulators on the northern embankment. River waters flowed south into the Kumar and supplied floodplains to the west of the sampling sites. A small flow of water from the Bhubaneswar entered the sampled floodplain through a northern canal. However, most river floodwater entered via canals to the east which transported floodwaters from the Arial Khan which entered through two breaches in the eastern embankment. The general direction of flow of water across the floodplains was from the north and east towards the south and west emptying into the Kumar system.

Flooding reached a peak in early to mid-September when a maximum depth of 3.3 m was recorded on the lowest land. At this time substantial areas of higher land (>4.5 m) inside the scheme remained dry or with only shallow (<0.3 m) flooding. The flood recession commenced in late September and water levels decreased rapidly until late November following closely the falling levels in the adjacent Padma River (Fig. 3.3). The two sampling sites were drained principally by one canal, Bogail *Khal*, which was sampled along its entire length running south. During the initial flood recession some waters also drained out of a canal to the east which also ran southwards to the Kumar. Following the disconnection between floodplains and canals, the remaining residual waters gradually decreased during

Figure 3.2 Seasonal variation in water depths at different land elevations on floodplains inside the Chatla-Fukurhati Project



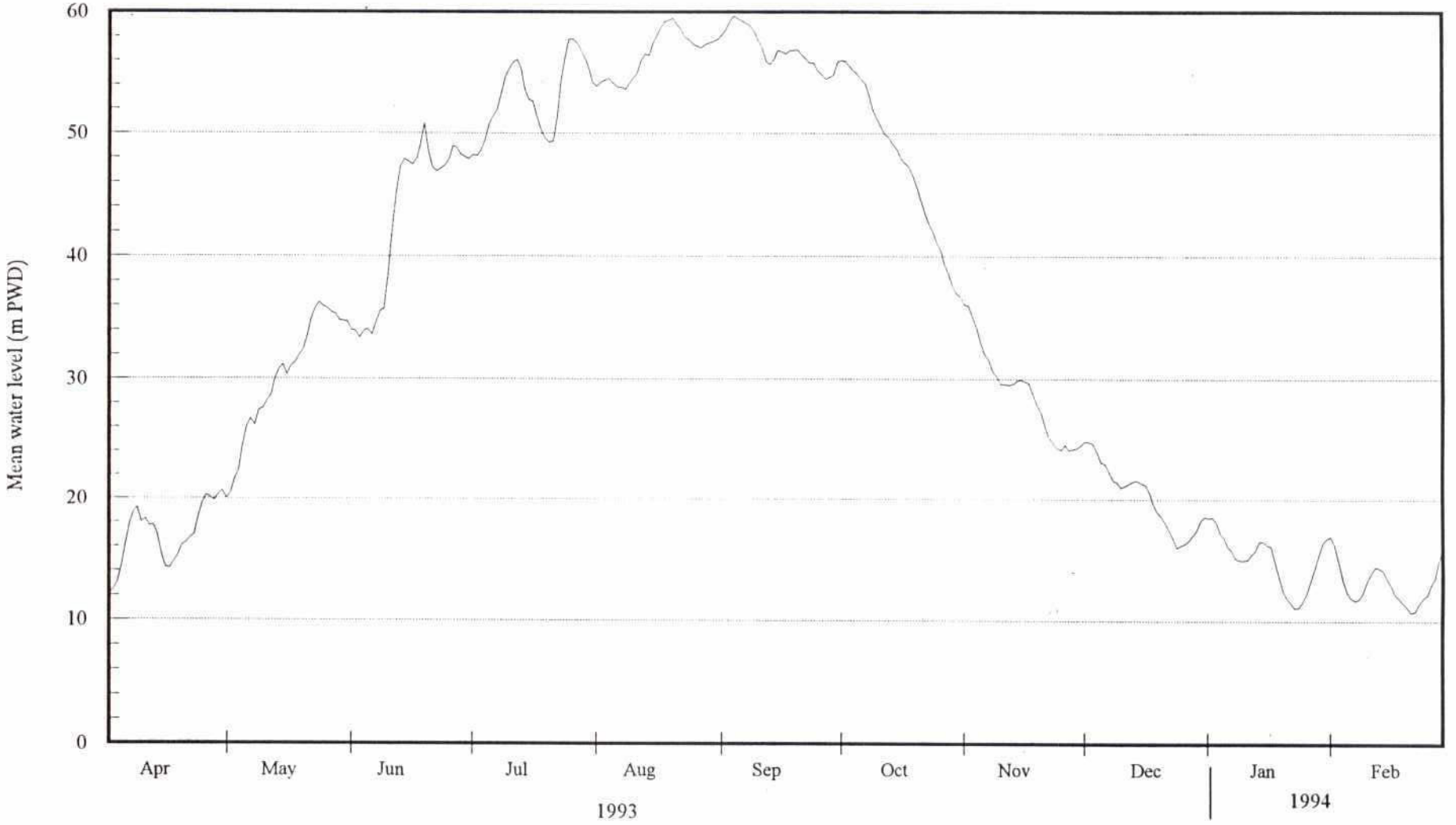
WL1= 1.98m WL2=2.13m, WL3=3.35m.



WL1=1.52m, WL2=1.83m, WL3= 2.13m, WL4=3.04m.

WL = Land elevation (m) at positions of depth measurement.

Figure 3.3 Water levels of the Padma River at Mawa, 1993-1994



December and January due to seepage and evaporation, leaving water only in *kuas* and irrigated rice fields.

3.3 Impact of FCD Project

3.3.1 Flood source

Pre-monsoon rainfall flooding drained more rapidly within the scheme while river floodwaters entered more freely than those on sites outside the scheme. Therefore a greater proportion of the monsoon flood resulted from river flooding inside the scheme compared with the sampled areas outside it.

3.3.2 Flood timing and duration

The FCD scheme had no effect on the timing of the first pre-monsoon rainfall floods, the first entry of the river floodwaters, and the start of the flood drawdown. However, the rate of flood drawdown was greater inside the scheme than outside and this could be attributed to a more efficient drainage system. The more rapid flood recession inside the scheme would be expected to result in higher water velocities in drainage canals and on floodplains although no measurements were obtained to confirm this. As a result of the more rapid flood drawdown, the duration of the flood was shortened by two to four weeks in December when residual waters dried more rapidly than those on sites outside the scheme.

3.3.3 Flood magnitude and extent

The depth of pre-monsoon rainfall flooding was about 0.5.m lower than that outside the scheme because of a more efficient drainage system. However, from mid-June until the end of November flood levels inside the scheme were about 0.5 m higher than those outside it resulting from the greater ingress of river floodwaters via *khals* and breaks in embankment.

3.4 Conclusions

The principal conclusion to be drawn from the summaries of flooding patterns given above is that the floodplain sites selected as free-flooding control areas were in fact less freely-flooded than floodplains within the scheme and also more poorly drained. Preliminary investigations prior to selection of the scheme and control areas indicated that direct overbank

spillage from the Kumar river into the control sites had a greater impact on flooding than that of the Arial Khan and Bhubaneswar on the Chatla *Beel* within the scheme. That this did not occur can only be attributed to the network of earthen roads, in varying states of repair, around the control site acting as flood control embankments.

This serves as one example of a considerably larger-scale problem arising from rural road development projects, frequently supported by the Food for Work Programme, which proceed without detailed consideration of the impact on local drainage patterns. This often results in few or no culverts being installed thus leading to drainage congestion which may adversely affect agriculture and cause blockage to fish movements thereby reducing the contribution of migratory species to fish catches.

Since sites outside the scheme did not function as free-flooding control areas, it was not possible to accurately assess quantitative changes in flooding patterns within the scheme resulting from the construction of flood control embankments.

4 WATER QUALITY

Surface water measurements of temperature, pH, dissolved oxygen (DO), conductivity and total dissolved solids were made at monthly intervals using electronic metering techniques. Seasonal variations in each of these parameters are presented for one representative floodplain site inside and outside the FCD scheme and for the principal feeder rivers, the Arial Khan and the Kumar (Figs. 4.1-4.4). Given that temperature, pH and DO levels on floodplains generally depend on the time of day, attempts were made to standardise times when measurements were taken. However, this was not always achieved and whilst most readings were taken between 08.00-12.00, some were outside this range. Therefore the data presented in Figs. 4.3 and 4.4 also reflect diurnal changes as well as seasonal variations.

Dissolved oxygen concentrations in open waters of floodplains ranged from about 3-5 mg/l and 1-5 mg/l inside and outside the FCD scheme respectively. Previous more detailed studies carried out in Bangladesh showed that oxygen levels fluctuated over a 24 hour period from anoxic (zero oxygen) condition near dawn to supersaturation in mid-afternoon in several deep water rice fields (DWR) and open water floodplains[1, 2]. These studies also revealed considerable vertical stratification in oxygen levels in DWRs with lowest concentrations (near zero) in the bottom layers whilst surface layers remained near saturation. The effects of stratification were found to be more pronounced towards the end of the flood season when amounts of decomposing macrophytic vegetation increased.

No clear seasonal patterns in the variation of pH levels were observed at any site and the range in pH values recorded inside the scheme (6.9-7.5) was similar to that outside it (6.5 - 7.5) and to values recorded from adjacent rivers. All pH values recorded on floodplains were near neutral level posing no danger to fish health or survival.

Conductivities of floodplain waters showed similar seasonal trends inside and outside the scheme. Lowest values (about 200 μS) were recorded during full flood conditions when river waters entered the floodplains. Following the flood drawdown, conductivities increased to

---

[1] ODA, 1984 Nitrogen fixation in deepwater rice fields of Bangladesh. Final Report 1981-1984 presented to the Overseas Development Administration, UK.

[2] ODA, 1988 Deepwater Rice Project, Phase Two. Annual Technical Report for 1987. Bangladesh Rice Research Institute and UK Overseas Development Administration.

about 300-600 μS between December 1993 and February 1994 at inside and outside sites. The increase can be attributed to a combination of natural changes such as plant decomposition in decreasing volumes of water and artificial processes such as the seepage into sites of pumped tubewell water used to irrigate winter rice crops. The highest value recorded (838 μS) at SW05 in February 1993 was almost certainly the result of pumped irrigation.

Figure 4.1 Water quality, site SW02: Arial Khan River

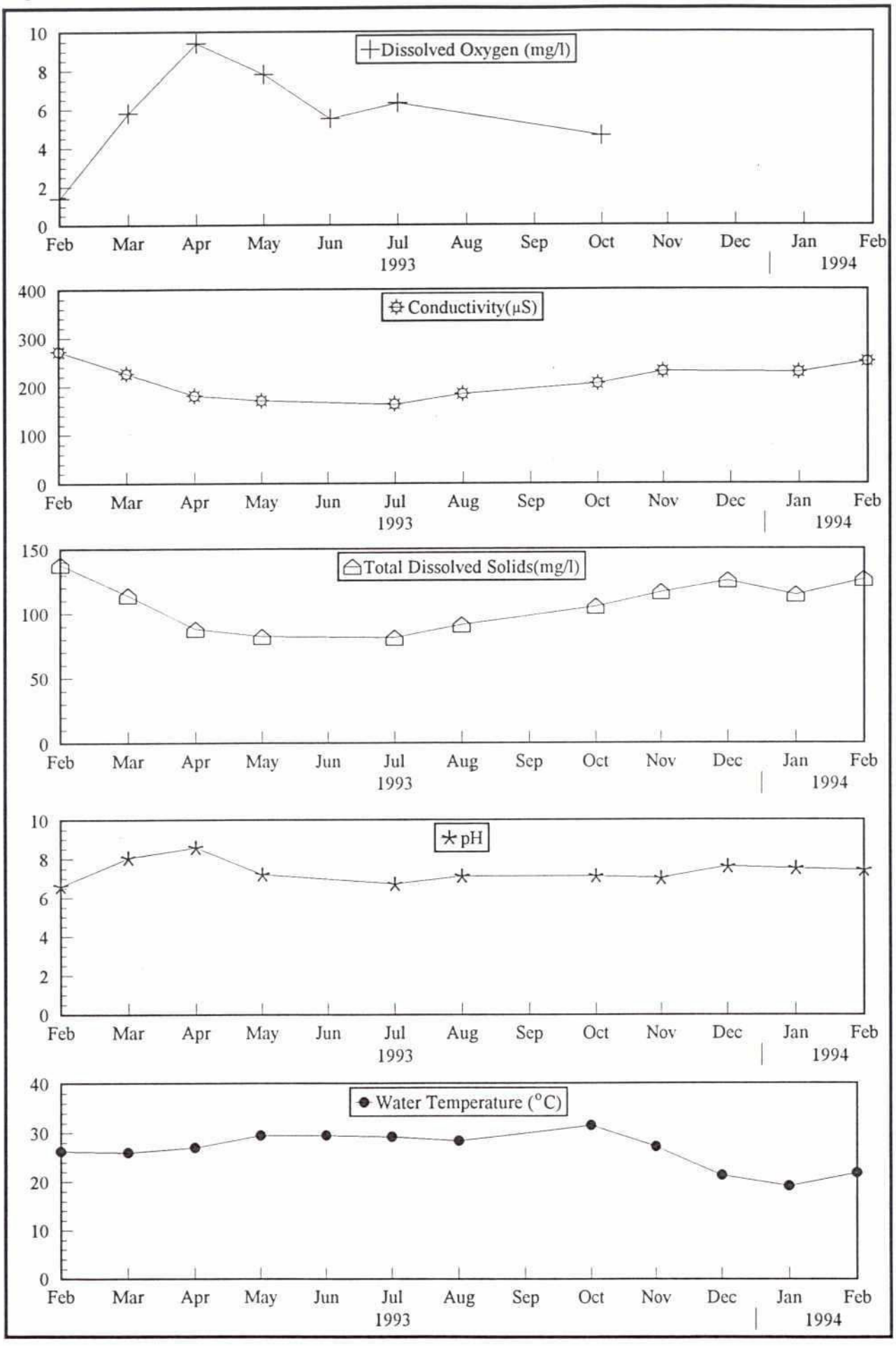


Figure 4.2 Water quality, site SW07: Kumar River

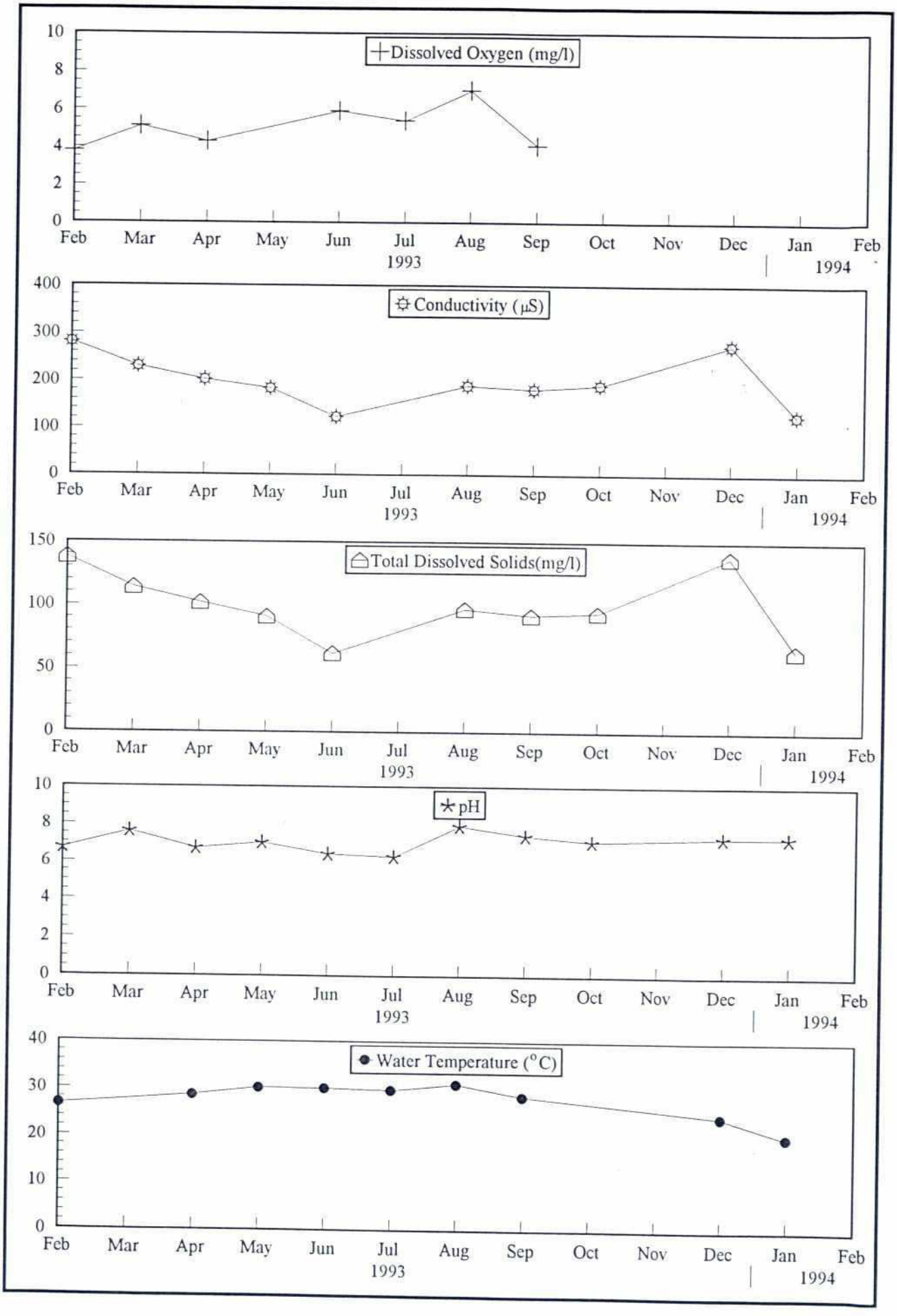


Figure 4.3 Water quality, site SW09: floodplain outside FCD project

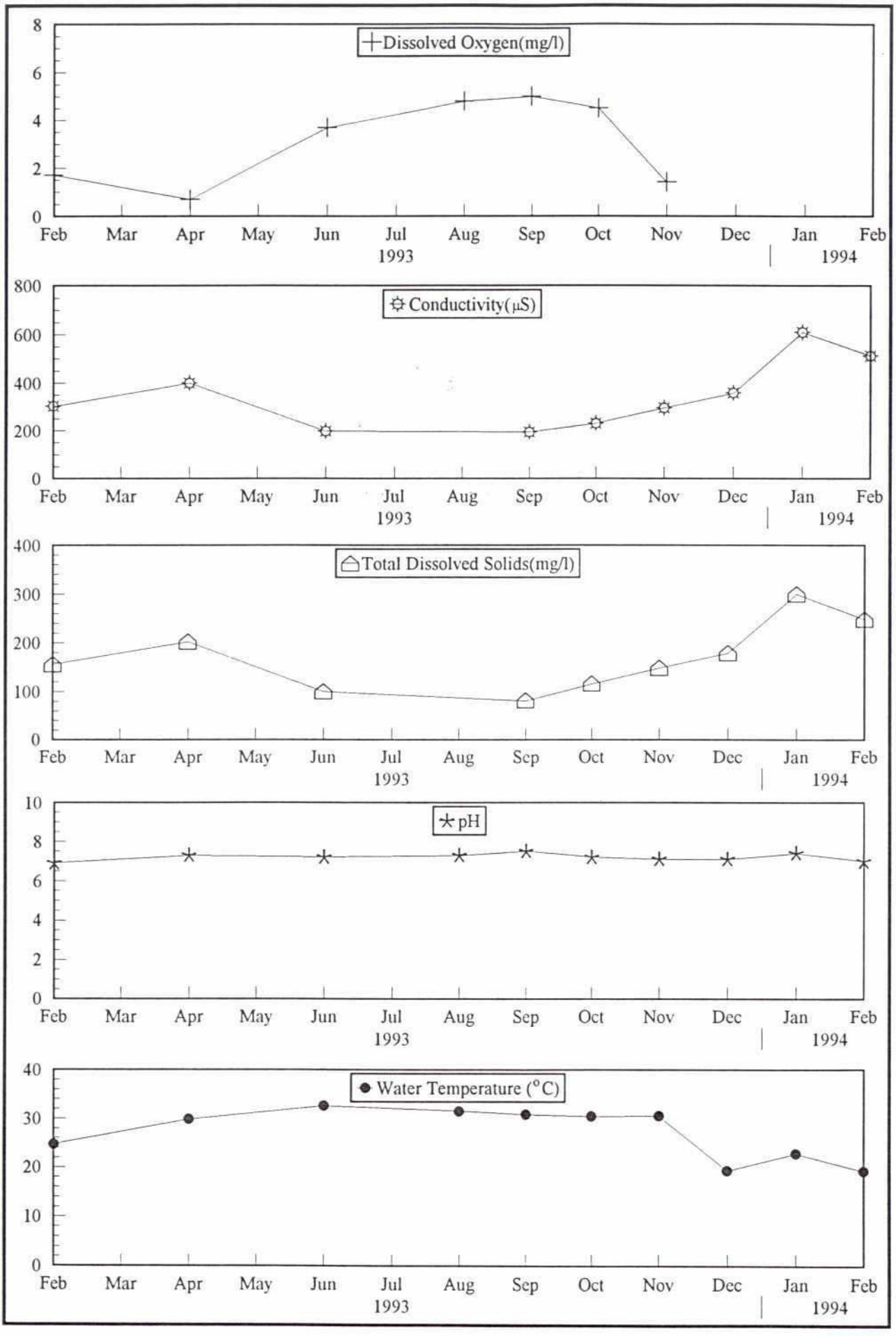
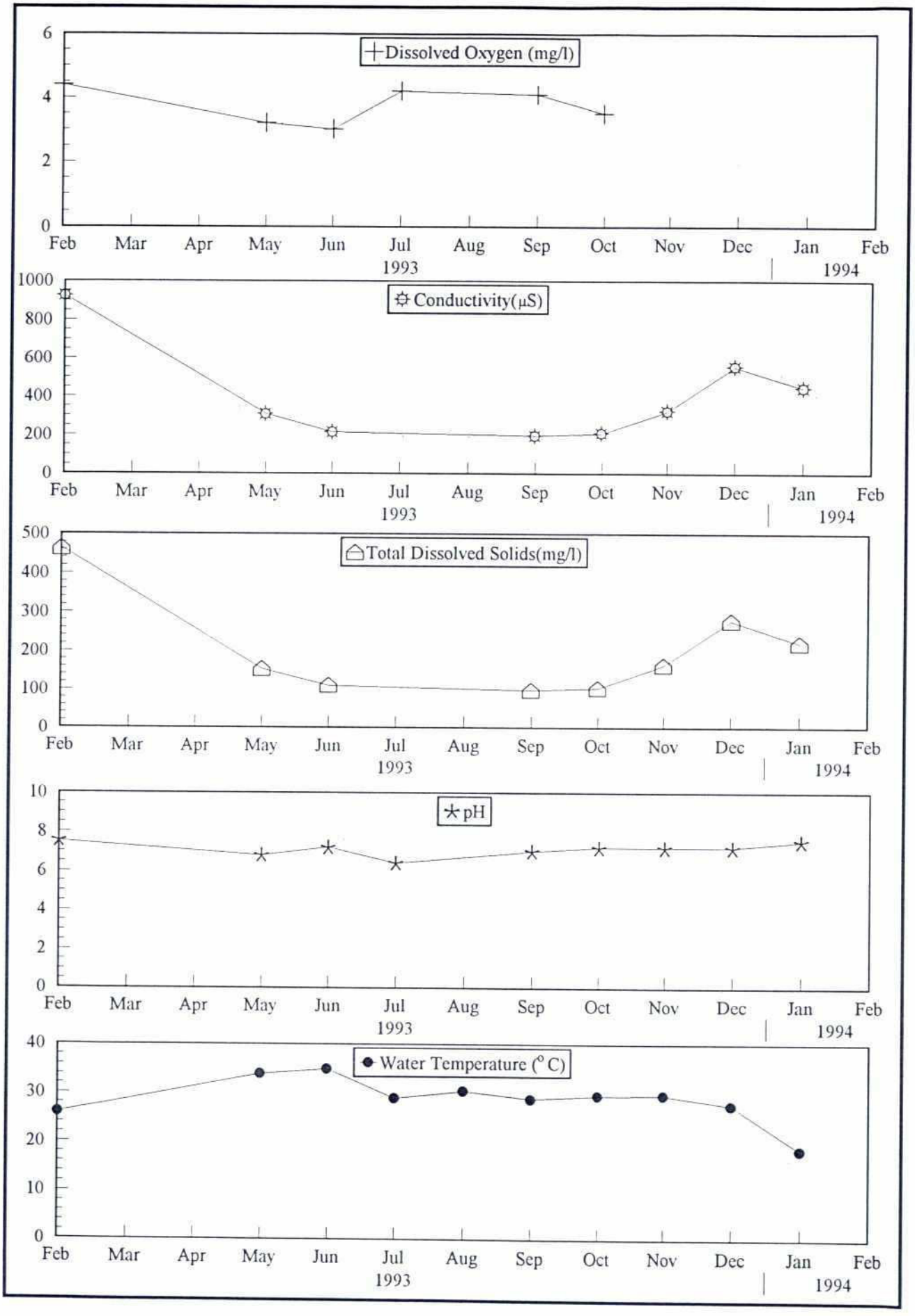


Figure 4.4 Water quality, site SW05: floodplain inside FCD project



5 RIVER FISHERIES

Fishing activities in rivers, canals and floodplains were monitored at fortnightly intervals between February 1993 and February 1994 using sampling methods described in the FAP 17 Inception and Interim Reports. The following discussion deals with each habitat in turn when describing and inter-relating various features of the fisheries of the Chatla-Fukurhati Scheme and its control area, Andolir *Beel*.

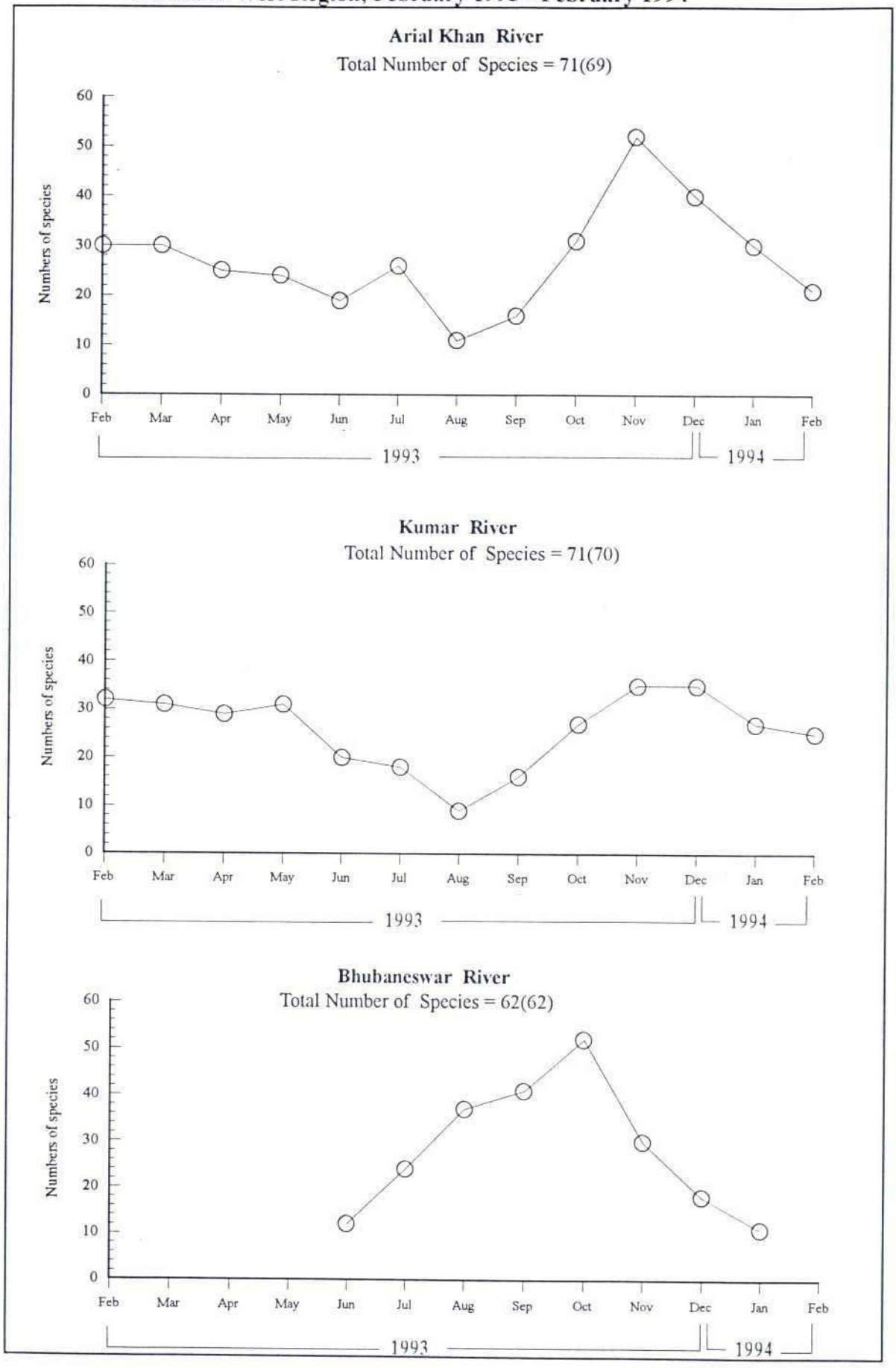
Detailed descriptions of the fish and fisheries of rivers studied in the South West Region have been presented previously (Supporting Volume No. 2, Fisheries Study: Satla-Bagda Polder 1). In the present report data on the seasonal changes in catch compositions are summarised briefly to provide information on the relationship between fish populations in these rivers and on floodplains inside and outside the Chatla-Fukurhati Scheme.

5.1 Biodiversity and Catch Composition

5.1.1 Species richness

A total of 71 species of fish was recorded from each of the Arial Khan and Kumar rivers between February 1993 and February 1994, compared with 62 from the Bhubaneswar River (Fig. 5.1). Seasonal patterns in the variation in total number of species were very similar in the perennial Arial Khan and its distributary, the Kumar. The numbers of species recorded generally declined during the flood season, June to September, but rose sharply during the flood drawdown in October and November before declining again during the winter months, December to February. The trend found in the Bhubaneswar reflected its highly seasonal nature, ranging from completely dry in the winter (February-April) to the sudden arrival of an influx of floodwaters from the Padma in mid-June followed by spate conditions in September. All three rivers exhibited peak numbers of species during the drawdown when many species migrated from the rapidly drying floodplains.

Figure 5.1 Seasonal variation in the number of fish species recorded from rivers in the South West Region, February 1993 - February 1994



Note: Annual total number of species recorded between March 1993 and February 1994 given in parentheses

5.1.2 Catch composition

The percentage contributions to the total annual catch made by dominant species in each river are presented in Table 5.1. More detailed results of monthly catch compositions are given in Tables 5.2 to 5.4. Species listed in tables have been divided into three categories of habitat preference defined below:

a) Riverine

Species which are usually confined to rivers and estuaries (or sea in the case of *ilish*) throughout their life cycle with no dependence on the floodplain, although some species can occasionally be found on more extensive floodplains, particularly in the North East Region.

b) Migratory

Species which move between river and floodplain during different stages of their life cycle.

c) Floodplain resident

Species which are capable of surviving in perennial waters of the floodplain throughout the year. Many of these species inhabit a variety of freshwater habitats, including large rivers.

Catches from both the Arial Khan and Kumar rivers were dominated by prawns (30-31%) and secondarily by *bailla* (19%). In contrast, prawns comprised 10% of the catch from the seasonal Bhubaneswar River and *bailla* only 4%. Riverine and migratory species formed about 41% of the catches from both the Arial Khan and Kumar but less in the Bhubaneswar (26%) where large riverine species were absent but proportionately more migratory species, particularly major carps, were found. The most abundant riverine species were *ilish* in the Arial Khan and *kachki* in the Kumar. Floodplain resident species formed 27% and 29% of the catches from the Arial Khan and Kumar but dominated (64%) catches from the Bhubaneswar where most (84%) of the annual catch was captured during the two months of the flood drawdown (October-November) when fish moved off the floodplains into rivers.

Table 5.1 Percentage contribution to the total annual catch by dominant species in rivers of the South West Region, March 1993–February 1994

Habitat Preference	Species name		Rivers		
	Scientific	Bengali	Arial Khan	Kumar	Bhubneswar
Riverine	*Rita rita*	*Rita*	2.4	1.0	–
	Hilsa ilisha	*Ilish*	14.0	1.9	–
	Corica soborna	*Kachki*	6.0	16.8	–
	Rhinomugil corsula	*Khorsula*	2.8	–	–
	Ailia coila	*Kajuli*	–	–	–
	Clupisoma garua	*Ghaura*	1.7	2.4	–
	Pama pama	*Poa*	–	1.2	–
	Pangasius pangasius	*Pangas*	2.9	–	–
Subtotal			29.7	23.4	–
Migratory	*Aorichthys aor*	*Ayre*	3.6	2.3	–
	Mystus bleekeri	*Golsha tengra*	–	–	1.3
	Mystus cavasius	*Kabashi*	–	–	1.2
	Catla catla	*Catla*	–	–	5.4
	Cirrhinus mrigala	*Mrigel*	–	1.0	–
	Cirrhinus reba	*Raik*	–	2.1	8.9
	Labeo bata	*Bata*	–	–	1.1
	Labeo rohita	*Rui*	–	2.3	4.1
	Gudusia chapra	*Chapila*	–	1.9	–
	Wallagu attu	*Boal*	1.6	–	–
Subtotal			5.2	9.7	22.1
Floodplain Resident	*Mystus vittatus*	*Tengra*	–	–	5.1
	Colisa fasciatus	*Khalisha*	–	–	1.3
	Xenentodon cancila	*Kaikka*	–	–	11.7
	Puntius conchonius	*Canchan puti*	–	1.4	1.2
	Puntius sophore	*Puti*	1.7	1.5	7.3
	Puntius ticto	*Tit puti*	–	–	2.5
	Glossogobius giurus	*Bailla*	19.5	19.4	4.4
	Lepidocephalus guntea	*Gutum*	–	–	1.3
	Channa marulius	*Gajar*	–	–	4.0
	Channa punctatus	*Taki*	–	–	7.3
	Channa striatus	*Shol*	–	–	1.1
	Macrognathus aculeatus	*Tara baim*	–	–	1.2
	Macrognathus pancalus	*Guchi*	–	–	3.5
	Mastacembelus armatus	*Baral baim*	–	–	2.6
	Notopterus notopterus	*Foli*	–	–	1.2
	Tetraodon cutcutia	*Potka*	–	–	1.1
Subtotal			21.2	22.3	58.7
	Macrobrachium rosenbergii	*Golda*	1.2	–	–
	Prawn spp.	*Chingri/Icha*	30.0	30.3	9.7
Subtotal			31.2	30.3	9.7
Grand total			87.2	85.6	90.5

Notes:

1. Dominant species are those species contributing 1% or more by weight to the total annual catch in each river
2. Shaded values highlight the most abundant species(>4%)
3. See text for definitions of habitat preference categories

Table 5.2 Monthly catch composition (% by weight) from Arial Khan River: site SW02

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
186	Riverine	*Rita rita*	*Rita*	0.4567	–	–	–	2.1796	17.4220	–	5.4521	2.8985	1.2405	0.8298	0.5091	–	418.1080	2.3780
99		*Labeo angra*	*Angrot*	0.6086	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13		*Aspidoparia morar*	*Piali*	0.4306	–	–	–	–	–	–	–	–	–	–	–	–	–	–
59		*Crossocheilus latius*	*Kalabata*	–	–	0.1355	–	–	–	–	–	–	–	0.1314	–	–	4.6690	0.0266
139		*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	–	0.1425	–	–	–	1.3180	0.0075
28		*Botia dario*	*Rani*	1.2508	–	0.0734	–	–	–	–	–	–	–	–	–	–	1.9740	0.0112
89		*Hilsa ilisha*	*Ilish*	2.1507	16.4160	15.1820	3.3752	1.3339	6.3431	27.7660	72.9140	4.9611	–	0.1413	–	1.3543	2457.4550	13.9767
85		*Gonialosa manmina*	*Goni chapila*	–	–	–	0.1155	–	–	–	–	–	–	–	–	–	1.0460	0.0059
58		*Corica soborna*	*Kachki*	41.7630	9.6872	16.7850	–	0.0156	0.0380	–	–	–	0.0769	2.3722	14.7960	–	1051.2070	5.9787
70		*Eleotris fusca*	*Budh bailla*	–	–	–	–	–	0.5742	–	–	–	0.3080	–	–	–	9.0210	0.0513
193		*Setipinna phasa*	*Phasa*	–	–	0.1330	0.0479	–	–	–	–	–	1.1080	0.7926	0.1028	–	23.5360	0.1339
10		*Apocryptes bato*	*Chiring*	–	–	–	1.6314	–	–	–	–	–	–	–	–	–	14.7620	0.0840
159		*Parapocryptes batoides*	*Dali chewa*	–	–	0.0323	–	–	–	–	–	–	–	–	–	–	0.8710	0.0050
952		*Awaous grammepomus*	*Nonda baila*	0.5108	–	1.7417	1.1320	0.8345	0.6041	–	0.3009	–	0.0162	3.5821	0.9330	0.5397	141.8890	0.8070
30		*Brachygobius nunus*	*Nuna bailla*	–	–	–	1.0653	–	–	–	–	–	–	–	–	–	9.6400	0.0548
185		*Rhinomugil corsula*	*Khorsula*	8.6819	3.5689	2.5045	0.5675	3.8147	0.0247	0.3062	2.5191	8.0391	2.5580	0.8294	2.3818	–	487.9790	2.7754
167		*Polynemus paradiseus*	*Tapasi*	–	–	–	–	0.2437	–	–	–	–	–	–	–	–	2.6370	0.0150
2		*Ailia coila*	*Kajuli*	0.3649	0.1343	–	0.0433	–	0.0495	0.2553	0.1516	0.1275	3.3983	0.7341	0.2554	0.0882	55.2850	0.3144
3		*Ailia punctata*	*Kajuli*	–	–	–	–	–	–	–	–	–	–	1.8130	–	–	14.1400	0.0804
51		*Clupisoma garua*	*Ghaura*	2.5237	1.6346	0.4116	0.2951	3.1412	0.2284	–	1.0604	3.1658	2.7187	3.5938	1.2546	3.3951	295.9040	1.6829
196		*Silonia silondia*	*Shillong*	–	–	1.2782	–	–	0.3048	–	0.7671	–	0.2173	0.0834	–	–	56.1910	0.3196
16		*Bagarius bagarius*	*Baghair*	–	0.1759	–	–	–	–	–	–	0.0772	–	14.6500	0.2892	–	127.0350	0.7225
81		*Gagata youssouli*	*Gang tengra*	0.1459	–	–	–	–	–	–	–	–	0.0888	1.4888	1.3531	–	53.1590	0.3023
155		*Pama pama*	*Poa*	0.5880	0.1051	0.1224	–	0.1960	0.4282	–	0.1734	0.2264	0.2432	0.1742	0.1001	1.0186	39.4720	0.2245
158		*Pangasius pangasius*	*Pangas*	–	–	18.1610	0.2523	–	–	–	–	0.5332	–	–	–	–	501.8810	2.8544
146		*Odontamblyopus rubicundus*	*Lal chewa*	–	–	0.6714	–	–	–	–	–	–	–	–	–	–	18.0550	0.1027
208		*Trypauchen vagina*	*Sada chewa*	1.6405	0.5079	–	–	–	–	–	–	–	–	–	–	–	7.0660	0.0402
953		*Cynoglossus cynoglossus*	*Khongi*	–	–	0.0450	–	–	–	–	–	–	0.0389	–	–	–	1.5710	0.0089
	Subtotal			61.116	32.230	57.277	8.526	11.759	26.017	28.327	83.339	20.029	12.155	31.216	21.975	6.396	5795.871	32.964
130	Migratory	*Acrichthys aor*	*Ayre*	–	1.2480	0.2320	0.1624	0.1621	2.8591	–	–	–	14.2510	25.6700	5.7282	5.1101	627.2090	3.5672
131		*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	0.7158	0.1374	–	–	0.2290	19.2900	0.1097
132		*Mystus cavasius*	*Kabashi*	0.0140	0.0757	–	0.3417	1.2844	–	–	–	0.1607	–	–	–	–	21.4330	0.1219
47		*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	–	0.3784	–	–	–	3.5000	0.0199
48		*Cirrhinus reba*	*Raik*	0.0640	0.1143	–	0.5781	6.9363	–	–	–	0.2556	–	0.9942	–	–	95.0220	0.5404
102		*Labeo calbasu*	*Kalbaus*	–	1.2640	–	–	–	–	–	1.1174	–	0.6597	0.0437	–	–	47.1590	0.2682
107		*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	–	–	0.6319	–	1.2459	–	43.3450	0.2465
188		*Salmostoma bacaila*	*Katari*	1.1690	0.0394	0.1641	–	–	–	–	–	–	0.3308	–	0.1632	0.1086	14.3210	0.0815
189		*Salmostoma phulo*	*Fulchela*	–	–	0.0443	0.0379	–	0.6670	0.4470	–	0.4237	0.2851	–	0.2880	0.0339	30.5890	0.1740
86		*Gudusia chapra*	*Chapila*	6.2802	2.1750	0.3727	–	–	–	–	–	–	0.0266	4.1372	2.6908	–	153.7780	0.8746
76		*Eutropiichthys vacha*	*Bacha*	–	–	–	–	–	–	–	–	0.1315	0.0434	–	–	0.1828	5.5090	0.0313
169		*Pseudeutropius atherinoides*	*Batasi*	–	–	–	0.0270	0.0627	0.0571	–	–	–	0.3165	0.7247	–	–	10.1180	0.0575
209		*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	5.3658	4.4079	1.7443	11.4840	283.1050	1.6102
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	3.8190	–	–	–	35.3220	0.2009
	Subtotal			7.527	4.916	0.813	1.147	8.446	3.583	0.447	1.117	1.687	26.246	35.978	11.860	17.148	1389.700	7.904

Note: – denotes zero catch

(Cont.)

Table 5.2 Monthly catch composition (% by weight) from Arial Khan River: site SW02

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
136	Floodplain	*Mystus tengara*	*Bajari tengra*	–	–	–	–	–	–	–	0.0086	–	2.0179	–	–	–	18.8430	0.1072
137	Resident	*Mystus vittatus*	*Tengra*	–	0.0674	–	–	–	0.6306	–	–	0.0729	2.8299	0.3867	0.5516	0.1579	57.0650	0.3246
55		*Colisa fasciatus*	*Khalisha*	–	0.0581	–	2.0641	–	0.2956	–	–	0.0483	0.2047	0.0311	–	–	25.8210	0.1469
211		*Colisa labiosus*	*Khalisha*	–	–	–	–	–	0.5706	–	–	0.0219	–	–	–	–	6.5950	0.0375
56		*Colisa lalia*	*Lal khalisha*	–	–	–	–	–	–	–	–	–	0.0403	–	–	–	0.3730	0.0021
210		*Xenentodon cancila*	*Kaikka*	0.4286	–	–	–	–	–	1.5325	–	0.3422	0.6461	1.2096	1.2172	–	63.4100	0.3606
187		*Osteobrama cotio cotio*	*Keti*	0.0386	0.2682	0.1402	0.1209	–	–	–	–	0.2922	0.2780	0.6218	0.0727	0.2667	27.7760	0.1580
175		*Puntius conchonius*	*Canchan puti*	0.4921	0.0120	0.0049	0.1209	–	0.8491	–	–	2.5600	2.3350	0.6703	1.2958	0.1003	131.6080	0.7485
180		*Puntius sophore*	*Puti*	0.3051	0.2248	0.0126	–	1.9984	1.9775	–	0.0026	2.5796	10.6760	0.6373	2.9124	0.6819	300.8700	1.7112
212		*Puntius ticto*	*Tit puti*	0.0055	0.0079	–	0.0487	0.0469	–	1.2772	–	0.3356	1.3671	0.9247	–	–	31.4510	0.1789
5		*Amblypharyngodon mola*	*Mola*	2.5218	–	–	–	–	–	0.2553	0.0301	–	0.0650	0.4485	0.6668	0.1533	27.4450	0.1561
68		*Danio devario*	*Chebli*	–	–	–	0.0105	0.1267	–	–	–	–	0.1554	–	1.7176	–	54.6010	0.3105
182		*Rasbora daniconius*	*Darkina*	–	–	–	–	–	–	0.8937	–	–	0.0999	1.0358	3.8071	–	126.0050	0.7167
83		*Glossogobius giurus*	*Bailla*	17.9250	34.3100	12.3330	4.0783	17.4940	9.8822	11.7250	7.4341	3.8687	7.8334	4.9493	37.9000	59.4550	3419.2720	19.4471
110		*Lepidocephalus guntea*	*Gutum*	–	–	–	–	–	–	–	–	–	3.6218	–	–	–	33.4980	0.1905
9		*Aplocheilus panchax*	*Kanpona*	–	–	–	–	0.6936	–	–	–	–	–	–	–	–	7.5050	0.0427
38		*Channa barca*	*Tila shol*	–	–	–	–	–	–	–	–	–	0.3446	–	–	–	3.1880	0.0181
39		*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	–	–	0.8060	0.4427	–	–	10.9080	0.0620
41		*Channa punctatus*	*Taki*	0.0115	0.0798	–	–	1.2138	5.9645	–	0.1734	0.1892	1.5285	0.3658	–	–	102.9230	0.5854
42		*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	–	0.0645	0.1316	0.8223	–	26.3740	0.1500
88		*Heteropneustes fossilis*	*Shingi*	–	–	–	–	0.9017	–	–	–	–	0.4919	–	–	–	14.3070	0.0814
123		*Macrognathus pancalus*	*Guchi*	0.2958	–	0.0612	0.0368	–	0.0374	–	–	1.9918	0.0307	–	–	–	44.6650	0.2540
122		*Mastacembelus armatus*	*Baral baim*	1.0711	0.3004	0.1068	–	–	0.7622	0.3192	0.3320	0.1050	0.1135	2.5210	–	–	45.9120	0.2611
148		*Ompok pabda*	*Madhu pabda*	–	0.0803	–	–	–	0.4204	–	–	–	0.0330	–	–	–	5.9430	0.0338
145		*Notopterus notopterus*	*Foli*	–	0.1184	–	–	–	–	–	–	–	1.1235	0.1622	0.7271	–	35.1890	0.2001
203		*Tetraodon cutcutia*	*Potka*	–	0.0053	0.2051	–	–	–	–	–	0.1527	0.2077	0.8225	–	–	17.1480	0.0975
35		*Chanda baculis*	*Chanda*	0.0055	0.0357	–	–	–	–	–	–	0.2858	0.8782	0.2322	–	0.3812	21.3260	0.1213
36		*Chanda nama*	*Nama chanda*	–	0.5979	–	0.0162	–	0.1143	–	–	0.0876	0.5353	0.4368	0.1519	0.2943	28.2320	0.1606
37		*Chanda ranga*	*Lal chanda*	0.0585	0.1573	–	–	–	0.3430	–	–	0.0438	0.5344	0.3363	0.0925	0.4763	23.2330	0.1321
	Subtotal			23.159	36.324	12.864	6.496	22.475	21.847	16.003	7.981	12.977	38.862	16.366	51.935	61.967	4711.486	26.797
998	Others	Unidentified fish		2.5741	4.0674	1.3271	–	–	–	–	0.0400	–	–	–	–	–	93.0930	0.5295
120		*Macrobrachium rosenbergii*	*Golda*	0.2945	0.1065	0.2235	–	–	–	–	0.0755	1.1237	7.7913	3.6408	1.0416	3.3571	207.4150	1.1797
931		Prawn spp.	*Chingri/Icha*	5.3273	22.3550	27.4940	74.0160	57.3200	48.5510	55.2230	7.4466	64.1820	14.9440	12.7980	13.1870	9.4867	5275.1020	30.0021
168		*Potamon*	*Kakra*	–	–	–	–	–	–	–	–	–	–	–	–	1.6444	20.9920	0.1194
500		*Platanicus gangeticus*	*Sishu*	–	–	–	9.8141	–	–	–	–	–	–	–	–	–	88.8070	0.5051
	Subtotal			8.196	26.529	29.045	83.830	57.320	48.551	55.223	7.562	65.306	22.735	16.439	14.229	14.488	5685.409	32.336
	Grand total			100	100	100	100	100	100	100	100	100	100	100	100	100	17582.466	100

Note: – denotes zero catch

Table 5.3 Monthly catch composition (% by weight) from Bhubaneswar River: site SW03

Species Code	Habitat Preference	Species name		Year: 1993							Year: 1994	Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	June	July	Aug	Sep	Oct	Nov	Déc	Jan	Kg	%
106	Riverine	*Labeo pangusia*	*Longu*	–	–	0.0860	–	0.0231	–	–	–	1.9130	0.0145
59		Crossocheilus latius	Kalabata	–	–	–	1.4031	–	–	–	–	12.2170	0.0923
139		*Nemacheilus botia*	*Balichata*	–	–	–	0.0413	0.4848	–	1.1859	–	39.3390	0.2972
28		*Botia dario*	*Rani*	–	–	0.0469	0.1240	0.1698	–	–	–	12.5890	0.0951
58		*Corica soborna*	*Kachki*	–	–	–	0.3307	–	–	–	–	2.8800	0.0218
185		*Rhinomugil corsula*	*Khorsula*	–	–	–	0.2236	–	0.1640	–	–	9.3030	0.0703
2		*Ailia coila*	*Kajuli*	–	2.1321	–	0.1994	–	–	–	–	3.7580	0.0284
51		*Clupisoma garua*	*Ghaura*	–	–	–	4.8521	0.0254	–	–	–	43.9410	0.3319
81		*Gagata youssoufi*	*Gang tengra*	–	–	0.0310	0.3168	0.0020	–	–	–	3.0260	0.0229
155		*Pama pama*	*Poa*	–	–	0.0388	–	–	–	–	–	0.1680	0.0013
	Subtotal			–	2.132	0.203	7.491	0.705	0.164	1.186	–	129.134	0.975
131	Migratory	*Mystus bleekeri*	*Golsha tengra*	–	–	0.1166	0.2902	1.2811	2.0005	–	–	177.9910	1.3446
132		*Mystus cavasius*	*Kabashi*	–	0.5053	0.1777	–	–	1.7848	14.2290	–	161.7030	1.2215
32		*Catla catla*	*Catla*	–	–	51.6190	31.7810	3.3187	–	–	–	720.6770	5.4441
47		*Cirrhinus mrigala*	*Mrigel*	–	–	2.7417	5.8709	0.3989	–	–	–	89.5230	0.6763
48		*Cirrhinus reba*	*Raik*	–	–	1.9398	1.6313	17.1710	0.2184	–	–	1175.3290	8.8786
100		*Labeo bata*	*Bata*	–	–	–	0.5232	2.1451	–	–	–	147.3360	1.1130
101		*Labeo boga*	*Bhangan*	–	–	–	–	0.2114	–	–	–	14.0750	0.1063
102		*Labeo calbasu*	*Kalbaus*	–	–	–	–	1.0143	–	–	–	67.5130	0.5100
107		*Labeo rohita*	*Rui*	–	–	16.4290	21.5090	4.2375	–	–	–	540.3420	4.0818
188		*Salmostoma bacaila*	*Katari*	–	–	–	0.3663	0.0081	–	–	–	3.7300	0.0282
189		*Salmostoma phulo*	*Fulchela*	–	–	0.0236	0.1488	0.7902	0.6143	–	–	81.5400	0.6160
154		*Securicula gora*	*Chora chela*	–	–	0.1488	–	–	–	–	–	0.6430	0.0049
86		*Gudusia chapra*	*Chapila*	2.7661	–	–	–	–	–	–	–	1.1830	0.0089
169		*Pseudeutropius atherinoides*	*Batasi*	–	–	–	0.0971	0.9992	–	–	–	67.3570	0.5088
209		*Wallagu attu*	*Boal*	–	–	–	–	0.1387	–	–	–	9.2350	0.0698
144		*Notopterus chitala*	*Chital*	–	–	–	–	0.9944	–	–	–	66.1920	0.5000
	Subtoal			2.766	0.505	73.196	62.218	32.709	4.618	14.229	–	3324.369	25.113
6	Floodplain	*Anabas testudineus*	*Koi*	2.1044	–	0.0391	–	–	0.1926	–	–	9.7070	0.0733
136	Resident	*Mystus tengara*	*Bajari tengra*	–	1.4738	–	–	0.2327	0.1755	3.9885	–	47.3120	0.3574
137		*Mystus vittatus*	*Tengra*	35.9920	1.4580	2.7234	0.7696	2.7423	4.8475	39.2900	11.6320	668.0090	5.0462
55		*Colisa fasciatus*	*Khalisha*	–	0.1898	0.2386	–	1.4850	1.6457	0.6580	–	177.5570	1.3413
211		*Colisa labiosus*	*Khalisha*	–	–	0.2929	0.6766	0.2435	0.1191	–	–	28.7110	0.2169
56		*Colisa lalia*	*Lal khalisha*	–	0.3354	0.2955	0.1409	–	–	–	–	2.8220	0.0213
57		*Colisa sota*	*Khalisha*	–	0.2078	–	–	0.0395	–	0.0877	–	3.3220	0.0251

Notes: 1. – denotes zero catch

2. No fishing activities were observed during surveys Mar'93– May'93

(Cont.)

Table 5.3 Monthly catch composition (% by weight) from Bhubaneswar River: site SW03

Species Code	Habitat Preference	Species name		Year: 1993							Year: 1994	Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Kg	%
210		*Xenentodon cancila*	*Kaikka*	–	–	0.1409	0.4482	18.5940	6.6887	–	–	1542.0060	11.6485
187		*Osteobrama cotio cotio*	*Keti*	–	0.9536	0.1400	0.1343	0.9835	–	–	–	68.1480	0.5148
175		*Puntius conchonius*	*Canchan puti*	4.2088	1.7977	0.1724	0.0780	0.5160	2.2295	4.2041	–	162.9980	1.2313
176		*Puntius gelius*	*Giliputi*	–	0.0453	–	0.0150	0.0013	–	–	–	0.2630	0.0020
180		*Puntius sophore*	*Puti*	5.4714	0.1624	0.9995	4.9578	5.0354	11.2330	5.8637	52.5160	970.5780	7.3319
212		*Puntius ticto*	*Tit puti*	6.4324	0.2531	0.6364	0.5424	1.7570	4.1086	2.7508	9.6266	336.0860	2.5388
5		*Amblypharyngodon mola*	*Mola*	–	1.6268	0.0627	0.2232	0.8407	–	–	–	59.7190	0.4511
68		*Danio devario*	*Chebli*	–	–	–	–	0.7064	0.8635	0.3424	–	87.6720	0.6623
75		*Esomus danricus*	*Darkina*	–	–	0.5135	0.3280	–	–	–	–	5.0750	0.0383
182		*Rasbora daniconius*	*Darkina*	–	0.1730	0.1134	6.0999	0.2545	0.9983	0.0903	0.6685	116.5960	0.8808
83		*Glossogobius giurus*	*Bailla*	18.1820	0.1276	1.0905	0.0689	3.2014	6.9515	6.4941	3.2089	577.6330	4.3635
43		*Chela cachius*	*Chep chela*	–	–	–	–	0.0107	–	–	–	0.7120	0.0054
110		*Lepidocephalus guntea*	*Gutum*	–	0.2352	–	–	0.7796	2.3810	2.5870	2.9458	176.2160	1.3312
217		*Lepidocephalus thermalis*	*Puiya*	–	–	–	–	0.0480	–	–	–	3.2000	0.0242
9		*Aplocheilus panchax*	*Kanpona*	–	–	–	0.0826	0.0913	–	–	–	6.8010	0.0514
39		*Channa marulius*	*Gajar*	–	–	0.0506	–	7.2577	0.9248	–	–	524.7670	3.9642
41		*Channa punctatus*	*Taki*	7.7441	17.3810	1.3383	0.4944	1.9360	16.8880	7.1822	4.6246	960.7390	7.2575
42		*Channa striatus*	*Shol*	–	–	0.0921	–	0.4550	2.4185	–	–	139.1100	1.0509
88		*Heteropneustes fossilis*	*Shingi*	3.7037	0.0727	–	–	0.6458	–	2.2636	–	57.4400	0.4339
121		*Macrognathus aculeatus*	*Tara baim*	–	1.9622	0.2670	0.2275	1.3537	1.2808	–	–	152.5240	1.1522
123		*Macrognathus pancalus*	*Guchi*	7.7441	1.4738	1.4517	0.4967	3.9294	9.8111	2.5870	2.0055	733.1820	5.5385
122		*Mastacembelus armatus*	*Baral baim*	–	–	0.1166	0.6700	1.0927	5.4816	4.0962	–	347.9760	2.6287
15		*Badis badis*	*Napit koi*	–	0.0548	–	0.0933	0.2072	0.0006	–	–	14.6840	0.1109
148		*Ompok pabda*	*Madhu pabda*	–	–	0.0530	–	0.3302	0.3593	–	–	38.3210	0.2895
145		*Notopterus notopterus*	*Foli*	–	–	0.1096	–	2.2187	0.2887	–	–	161.0990	1.2170
203		*Tetraodon cutcutia*	*Potka*	–	0.1076	–	0.1579	1.9376	0.2417	–	–	141.2860	1.0673
35		*Chanda baculis*	*Chanda*	–	–	–	0.0923	0.8541	–	–	–	57.6570	0.4355
36		*Chanda nama*	*Nama chanda*	2.5860	–	0.2585	1.8025	0.8086	0.0874	–	0.1337	75.7860	0.5725
37		*Chanda ranga*	*Lal chanda*	3.0654	0.1730	0.0467	0.3368	0.2042	0.1835	–	0.0528	26.4860	0.2001
	Subtotal			97.234	30.265	42.243	18.937	60.794	80.401	82.486	87.414	8482.200	64.076
998	Others	Unidentified fish		–	–	–	1.9027	–	–	–	–	16.5680	0.1252
118		*Machrob. villosimanus*	*Chingri dimua*	–	–	0.0705	–	–	–	–	–	0.3050	0.0023
931		Prawn spp.	*Chingri/Icha*	–	67.0980	15.2860	9.4506	5.7914	14.8170	2.0990	12.5850	1285.2370	9.7088
	Subtotal			–	67.098	15.356	11.353	5.791	14.817	2.099	12.585	1302.110	9.836
	Grand total			100	100	131	100	100	100	100	100	13237.813	100

Notes: 1. – denotes zero catch

2. No fishing activities were observed during surveys Mar'93–May'93

Table 5.4 Monthly catch composition (% by weight) from Kumar River: site SW07

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
186	Riverine	*Rita rita*	*Rita*	0.0782	–	0.1143	2.5688	–	–	–	3.7228	0.2854	–	6.1567	–	–	72.6820	1.0071
99		*Labeo angra*	*Angrot*	0.0865	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13		*Aspidoparia morar*	*Piali*	–	–	–	0.1399	0.2028	–	–	–	0.5172	–	0.0767	–	–	4.4070	0.0611
59		*Crossocheilus latius*	*Kalabata*	–	–	–	–	–	–	–	–	–	–	0.0831	–	–	0.5210	0.0072
28		*Botia dario*	*Rani*	–	–	0.3132	–	–	–	–	–	–	–	0.3668	0.7645	0.2649	10.0540	0.1393
89		*Hilsa ilisha*	*Ilish*	10.6110	6.6601	1.6984	–	–	–	–	–	–	–	–	–	–	140.3030	1.9441
85		*Goniakosa manmina*	*Goni chapila*	–	–	–	–	–	–	–	1.0944	–	–	–	–	–	5.2060	0.0721
58		*Corica soborna*	*Kachki*	55.8020	50.1550	15.8420	–	–	–	–	–	–	–	1.2288	18.6080	8.4528	1214.4970	16.8284
193		*Setipinna phasa*	*Phasa*	–	–	0.3170	2.1289	1.0754	–	–	–	1.6107	–	1.9179	2.6529	–	49.0670	0.6799
10		*Apocryptes bato*	*Chiring*	–	–	–	1.8883	–	–	–	–	–	–	–	–	–	10.1730	0.1410
159		*Parapocryptes batoides*	*Dali chewa*	–	–	0.8735	–	–	–	–	–	–	–	–	–	–	9.3000	0.1289
952		*Awaous grammepomus*	*Nonda baila*	–	1.1825	1.2570	0.9450	0.2820	–	–	–	–	–	–	–	–	41.2240	0.5712
185		*Rhinomugil corsula*	*Khorsula*	6.9005	1.4116	0.3469	2.1180	0.8902	0.6090	–	0.2522	3.7385	–	0.1086	0.4894	0.1279	67.9130	0.9410
2		*Ailia coila*	*Kajuli*	–	–	–	0.1715	0.0440	0.7479	0.7778	0.4435	0.6074	0.0686	7.4972	–	–	56.6370	0.7848
51		*Clupisoma garua*	*Ghaura*	0.5823	2.2367	1.3757	3.6390	0.0880	–	–	2.5948	3.0463	3.2914	4.8407	6.1855	–	173.7090	2.4070
196		*Silonia silondia*	*Shilkong*	1.4751	0.0821	0.0473	–	0.2114	–	–	–	–	–	–	–	–	2.8000	0.0388
81		*Gagata youssoufi*	*Gang tengra*	–	–	–	–	–	0.2706	–	–	–	–	0.0576	0.8292	0.5298	7.1080	0.0985
155		*Pama pama*	*Poa*	0.0109	1.5930	0.0822	5.6530	1.0314	1.0152	–	0.3935	0.6243	–	0.9588	1.4879	0.1285	84.5540	1.1716
158		*Pangasius pangasius*	*Pangas*	0.9834	–	–	–	–	–	–	–	1.4409	–	1.5384	7.0751	–	44.8350	0.6212
953		*Cynoglossus cynoglossus*	*Khongi*	–	–	–	–	–	0.1160	–	–	–	–	–	–	–	0.3100	0.0043
	Subtotal			76.530	63.321	22.268	19.252	3.825	2.759	0.778	8.501	11.871	3.360	24.831	38.093	9.504	1995.300	27.647
130	Migratory	*Aorichthys aor*	*Ayre*	–	0.3141	0.8319	0.0142	3.1393	4.4339	–	–	1.2744	2.8385	0.5425	3.3216	18.5270	169.0000	2.3417
135		*Aorichthys seenghala*	*Guizza*	–	0.1215	2.0814	0.9615	–	–	–	–	–	–	–	–	–	29.5690	0.4097
131		*Mystus bleekeri*	*Golsha tengra*	–	0.0121	0.0405	0.0178	–	–	–	–	–	0.7396	–	0.1983	3.9021	25.0060	0.3465
132		*Mystus cavasius*	*Kabashi*	–	–	0.7066	0.1731	–	–	–	0.4855	0.4532	8.2115	–	–	–	53.5290	0.7417
32		*Catla catla*	*Catla*	–	–	–	–	–	–	–	–	–	–	–	0.6753	–	2.7170	0.0376
47		*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	–	0.4299	11.3250	–	–	73.1030	1.0129
48		*Cirrhinus reba*	*Raik*	–	0.7493	–	–	–	–	–	–	4.9107	10.3080	8.0421	2.9619	0.2008	151.0460	2.0929
100		*Labeo bata*	*Bata*	–	0.0261	–	–	–	–	–	–	–	0.0933	1.5366	–	–	10.5720	0.1465
101		*Labeo boga*	*Bhangan*	–	–	–	–	–	–	–	–	–	0.1034	–	–	–	0.5120	0.0071
102		*Labeo calbasu*	*Kalbaus*	0.0777	0.0934	0.5983	–	–	–	–	–	–	0.6070	0.8477	–	–	16.4030	0.2273
107		*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	–	–	2.2544	24.5430	–	–	164.9670	2.2858
188		*Salmostoma bacaila*	*Katari*	2.7949	0.2234	–	–	–	–	–	–	–	–	0.1405	1.1489	–	9.6040	0.1331
189		*Salmostoma phulo*	*Fulchela*	2.1427	0.0854	1.0201	0.4386	0.3920	0.2182	–	0.0597	0.1164	0.0137	1.7181	0.8016	0.2101	32.7890	0.4543
86		*Gudusia chapra*	*Chapila*	1.6416	2.7283	1.5655	–	–	–	–	–	–	–	7.7327	5.3292	0.6575	139.9710	1.9395
76		*Eutropiichthys vacha*	*Bacha*	–	0.0934	0.2910	–	–	–	–	0.5791	–	–	–	–	–	7.5680	0.1049
169		*Pseudeutropius atherinoides*	*Batasi*	–	0.6656	0.5318	–	0.0354	0.4214	–	–	–	0.1066	1.2146	1.5150	–	33.3700	0.4624
209		*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	1.2627	–	–	–	6.2500	0.0866
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	3.3435	–	–	–	16.5500	0.2293
	Subtotal			6.657	5.113	7.667	1.605	3.567	5.074	–	1.124	6.755	30.312	57.643	15.952	23.498	942.526	13.060

Note: – denotes zero catch

(Cont.)

Table 5.4 Monthly catch composition (% by weight) from Kumar River: site SW07

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
6	Floodplain	*Anabas testudineus*	*Koi*	–	–	–	0.6218	–	–	–	–	–	–	–	–	–	3.3500	0.0464
136	Resident	*Mystus tengara*	*Bajari tengra*	–	–	–	0.1629	–	–	–	–	7.1351	0.0137	–	–	–	34.2710	0.4749
137		*Mystus vittatus*	*Tengra*	–	–	1.6659	–	–	–	–	–	–	0.6343	0.8808	–	0.9059	30.9920	0.4294
55		*Colisa fasciatus*	*Khalisha*	0.0051	–	–	–	–	–	–	–	0.2954	–	–	–	–	1.3800	0.0191
56		*Colisa lalia*	*Lal khalisha*	–	–	–	–	–	–	–	–	0.0443	–	–	–	–	0.2070	0.0029
57		*Colisa sota*	*Khalisha*	–	–	–	–	–	–	0.3014	–	0.1329	–	–	–	1.9181	10.8480	0.1503
210		*Xenentodon cancila*	*Kaikka*	0.4306	0.0634	0.0287	–	0.0483	–	–	–	–	0.4438	0.2088	0.9843	1.3980	16.2090	0.2246
187		*Osteobrama cotio cotio*	*Keti*	–	2.5953	0.3899	0.0640	–	0.1456	–	–	1.5324	0.3887	0.0571	0.0792	0.2091	63.3310	0.8775
175		*Puntius conchonius*	*Canchan puti*	1.7494	0.0603	0.5415	1.3365	–	–	–	–	6.2740	8.9190	1.6120	–	0.4878	100.1010	1.3870
176		*Puntius gelius*	*Giliputi*	0.0134	–	0.0247	–	0.0088	–	–	–	0.0584	0.0090	0.0135	–	–	0.6990	0.0097
180		*Puntius sophore*	*Puti*	2.1688	0.2041	0.6527	0.8072	0.3702	0.3436	1.4615	0.5679	3.7398	5.2620	3.3897	2.6308	2.2996	109.4550	1.5166
212		*Puntius ticto*	*Tit puti*	0.2195	0.7073	0.2036	0.2468	0.4360	0.5817	0.3390	–	0.4078	0.3171	–	0.6925	0.1115	27.0430	0.3747
5		*Amblypharyngodon mola*	*Mola*	0.0817	0.0325	0.0095	–	0.4142	–	1.0926	–	–	–	0.0817	3.6313	0.1393	19.8690	0.2753
68		*Danio devario*	*Chebli*	0.0020	0.0393	0.0815	0.0022	–	–	–	–	–	–	–	–	–	1.6020	0.0222
75		*Esomus danricus*	*Darkina*	–	–	–	–	–	0.1538	–	–	–	–	–	–	–	0.4110	0.0057
182		*Rasbora daniconius*	*Darkina*	0.0135	–	0.4697	0.2845	1.0714	0.9455	4.7204	–	–	0.3329	–	1.8513	0.1671	30.7650	0.4263
83		*Glossogobius giurus*	*Bailla*	7.3741	16.5470	26.5050	16.8710	3.8619	1.6440	45.2690	46.4840	11.0270	12.0150	2.5287	16.5450	42.5820	1400.5290	19.4062
110		*Lepidocephalus guntea*	*Gutum*	–	–	–	–	–	–	–	0.1513	–	1.0760	–	–	0.2229	7.1770	0.0994
9		*Aplocheilus panchax*	*Kanpona*	–	0.0850	–	–	–	–	–	–	–	–	–	–	–	1.5610	0.0216
39		*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	–	0.2914	1.2970	–	–	–	7.7810	0.1078
41		*Channa punctatus*	*Taki*	–	–	0.0911	1.1856	–	0.1093	–	–	0.6648	9.9874	0.2364	–	–	61.6720	0.8545
88		*Heteropneustes fossilis*	*Shingi*	0.1345	–	0.0047	–	–	–	–	–	–	0.1622	–	0.5649	–	3.1270	0.0433
121		*Macrognathus aculeatus*	*Tara baim*	–	–	0.7209	–	–	–	–	–	–	0.0040	–	–	–	7.6950	0.1066
123		*Macrognathus pancalus*	*Guchi*	0.1181	0.3172	0.8655	0.3760	0.0528	1.1634	–	0.2163	0.3494	2.7698	0.7696	–	–	41.5620	0.5759
122		*Mastacembelus armatus*	*Baral baim*	0.0259	–	2.6288	–	–	–	–	–	–	3.6530	–	1.6129	–	52.5580	0.7283
15		*Badis badis*	*Napit koi*	0.0134	–	–	0.0252	–	–	–	–	–	–	–	–	–	0.1360	0.0019
148		*Ompok pabda*	*Madhu pabda*	0.0941	0.2703	–	0.0222	–	–	–	–	–	0.5155	–	0.4161	–	9.3080	0.1290
145		*Notopterus notopterus*	*Foli*	–	–	–	–	–	–	–	–	–	0.9412	–	–	–	4.6590	0.0646
203		*Tetraodon cutcutia*	*Potka*	0.1211	–	–	–	–	–	–	–	–	–	0.1310	–	0.4878	3.2960	0.0457
33		*Chaca chaca*	*Cheka*	–	–	–	0.0142	–	–	–	–	–	–	–	–	–	0.0770	0.0011
35		*Chanda baculis*	*Chanda*	–	0.0234	0.1610	–	–	–	–	–	–	0.4412	–	–	–	4.3290	0.0600
36		*Chanda nama*	*Nama chanda*	0.0134	0.0720	–	0.0065	–	–	0.3767	0.0706	0.6147	0.2468	0.0738	–	0.0835	7.2940	0.1011
37		*Chanda ranga*	*Lal chanda*	0.1749	–	–	0.0013	–	0.2908	–	0.0302	0.8602	0.3234	–	0.3293	0.2787	9.2860	0.1287
	Subtotal			12.754	21.017	35.045	22.028	6.264	5.378	53.561	47.520	33.428	49.753	9.983	29.338	51.291	2072.580	28.718
998	Others	Unidentified fish		–	0.2698	–	–	–	–	–	–	–	–	–	–	–	4.9520	0.0686
120		*Macrobrachium rosenbergii*	*Golda*	–	0.1947	–	0.9800	–	–	–	–	–	0.8068	–	–	–	12.8480	0.1780
931		Prawn spp.	*Chingri/Icha*	4.0598	10.0840	35.0200	56.1340	86.3440	86.7900	45.6620	42.8540	47.9460	14.9550	7.5416	16.6170	15.7060	2184.7060	30.2720
945		*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	–	0.8119	–	–	–	4.0190	0.0557
	Subtotal			4.060	10.548	35.020	57.114	86.344	86.790	45.662	42.854	47.946	16.574	7.542	16.617	15.706	2206.525	30.574
	Grand total			100	100	100	100	100	100	100	100	100	100	100	100	100	7216.931	100

Note: – denotes zero catch

6 CANAL FISHERIES

6.1 Total Catch

6.1.1 Pattern of catch

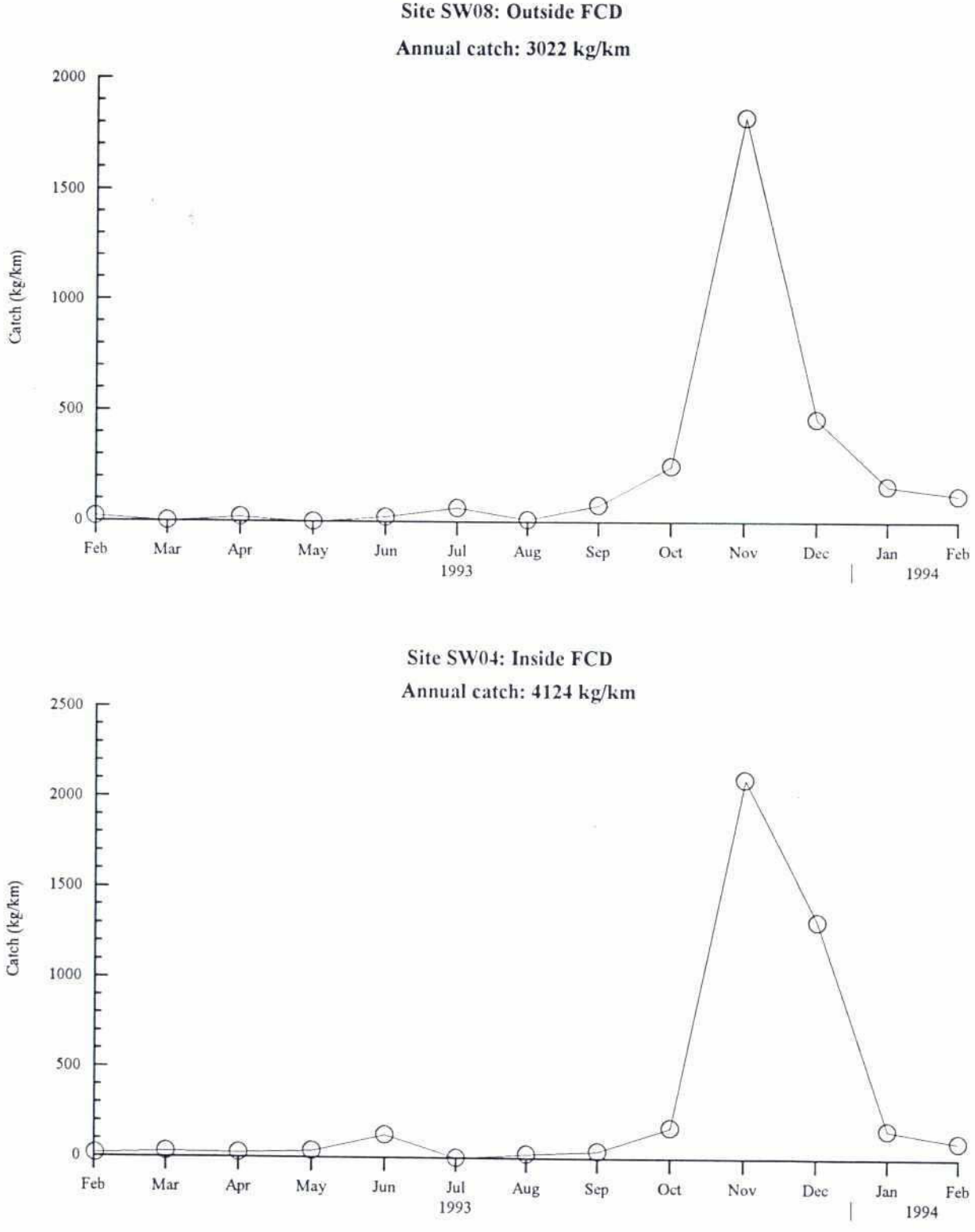
Seasonal variations in total catch followed an almost identical pattern at sites inside and outside the scheme (Fig. 6.1). The only major difference occurred in December when the catch from Bogail *Khal* inside the scheme was proportionately greater (32% of annual catch) than that from Rajandi *Khal* (15%). In both canals peak catches were recorded in November when fish moved off the floodplains towards adjacent rivers. In Rajandi *Khal*, 60% of the total annual catch was taken in this month alone while in Bogail *Khal* 51% of the annual catch was taken in the same month.

These are substantially higher proportions than those recorded from Satla-Bagda Polder and Bagihar *Beel* in the South West Region (Supporting Volume No. 2). In the latter study much higher shares of the annual catch were taken during the winter between December 1993 and February 1994. The difference in seasonal patterns of catch between the two areas can be explained in terms of their hydrological cycles. The canals around the Satla-Bagda Project and Bagihar drained lower-lying land and most were perennial whereas Rajandi and Bogail *Khals* drained higher land and were seasonal, drying out almost completely in March.

6.1.2 Size of catch

The total annual catch per unit length from Bogail *Khal*, inside the scheme, was 36% higher than that from Rajandi *Khal* outside it. In terms of catch per unit area, the difference between canals was even greater, with the catch in Bogail *Khal* being 52% higher than in Rajandi *Khal* since this was slightly wider (13m) than Bogail (11.7m). Examination of total monthly catches showed that only in December 1993 was there a major difference between canals (Fig. 6.1). During this month the catch per km from Bogail *Khal* was 1,318 kg compared with only 465 kg from Rajandi *Khal*. The substantially lower catch in December was the principal cause of the overall lower annual catch from Rajandi *Khal*.

Figure 6.1 Seasonal variation in the catch (kg/km) from canals outside and inside the Chatla - Fukurhati Project, February 1993 - February 1994



Compared with other canals studied in the South West Region, Bogail *Khal* supported the highest annual catch per unit length and per unit area whilst catch values from Rajandi *Khal* were very similar to those from Kalabari *Khal* which drained a free flooding area of Bagihar *Beel* (Table 6.1).

Table 6.1 Annual catch from canals in the South West Region, March 1993 - February 1994

FCD Project	Site	Name	Annual catch	
			kg/km	kg/ha
Chatla-Fukurhati Project	Outside: SW08	Rajandi *Khal*	3,022	2,325
	Inside: SW04	Bogail *Khal*	4,124	3,525
Satla-Bagda Polder 1	Outside: SW11	Amgramer *Khal*	785	500
	SW17	Satla-Bagda *Khal*	3,376	338
	SW12	Kalabari *Khal*	2,975	2,419
	Inside: SW20	Ambola *Khal*	2,182	1,818

6.2 Pattern of Fishing

6.2.1 Catch by gear

The percentage contributions made by dominant gears to the total annual catch from each canal site are presented in Table 6.2. More detailed lists of percentage monthly and annual catches of all recorded gears are given in Tables 6.3 and 6.4.

The total numbers of different types of gear used in each canal were similar: 14 and 15 in Bogail and Rajandi respectively. *Veshal* predominated in both canals, taking 44% of the annual catch from Rajandi and 31% from Bogail. Gears which captured similar proportions of the annual catch inside and outside the FCD scheme included *jhaki jal* (17% inside, 19% outside) and hand fishing (5% inside, 6% outside). Major differences in gear use between sites included the predominance of *ber jal* and small-scale gears such as *doiar traps* and *akra* on Bogail *Khal* compared with their limited use on Rajandi *Khal*. Results of household surveys carried out as part of FAP 17 socio-economic studies on neighbouring rural communities also revealed a greater abundance and use of *ber jal* and small gears such as traps and hook/lines inside the Chatla-Fukurhati compared with areas outside it. Conversely, gears which contributed higher proportions of the canal catch outside the scheme included *thella jal* and *katha*.

Table 6.2 Percentage contribution (by weight) to the total annual catch made by dominant[1] gears in canals outside and inside the Chatla-Fukurhati Project, March 1993 - February 1994

Gear name	Outside FCD: Site SW08	Inside FCD: Site SW04
Veshal	43.9	31.1
Jhaki jal	18.8	17.1
Thella jal	9.4	-
Katha	8.5	4.2
Hand fishing	6.5	4.6
Ber jal	4.5	21.3
Akra	-	7.6
Doiar trap	-	5.6

Note: 1. Dominant gears are defined as those gears which when ranked in order of abundance, comprised at least 90% of the total annual catch

6.2.2 Catch by gear by month

Seasonal patterns of canal fishing differed inside and outside the FCD scheme. During the pre-monsoon months of March and April 1993 when catches were very low in Rajandi *Khal*, *jhaki jal* and *thella jal* took most of the catch and later, during the rising and full flood (June-September) *veshal* took almost the whole catch (Fig. 6.2). During November, when the catch increased considerably, *veshal* accounted for 56% of the total while *jhaki jal* and *thella jal* again increased in importance, taking 15% and 10% of the catch respectively.

The sudden increase in catch during this month was a function of both increased fishing effort of the dominant gears (Fig. 6.3) and also increased catch rates (Fig. 6.4). During the winter months *katha*, *ber jal* and mechanical dewatering were the principal methods contributing most of the catch.

Inside the FCD scheme, on Bogail *Khal*, *jhaki jal* and *thella* were unimportant during the pre-monsoon months of March and April, instead *doiar* traps accounted for most of the catch (60-70%). During the rising floods of June *doiar* caught 96% of the catch and in July took the whole catch, albeit small, consisting only of prawns (Table 6.3 and Fig. 6.5). *Veshal* became important only during the flood drawdown. When catches rose sharply in November,

Table 6.3 Percentage monthly canal catch by gear type: outside FCD (site SW08)

Gear Code	Gear name	Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	Mar	April	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
266	*Veshal*	–	–	–	100.000	93.709	100.000	95.560	42.341	55.695	8.409	–	–	6225.937	43.931
164	*Jhaki jal*	18.847	–	46.642	–	3.101	–	4.050	48.735	15.486	27.267	12.832	–	2662.052	18.784
255	*Thella jal*	–	45.711	53.358	–	–	–	–	0.648	9.613	18.462	6.212	–	1337.514	9.438
270	*Katha*	69.900	–	–	–	–	–	–	–	2.778	26.795	43.626	7.903	1199.850	8.466
307	*Hand fishing*	8.155	–	–	–	–	–	–	–	8.996	5.338	3.623	–	914.573	6.453
45	*Ber jal*	–	–	–	–	–	–	–	–	4.456	–	33.593	–	638.106	4.503
336	*Canal dewatering*	–	–	–	–	–	–	–	–	–	–	–	91.366	519.103	3.663
30	*Sip*	–	–	–	–	–	–	0.390	4.453	1.642	6.292	0.114	–	332.609	2.347
88	*Current jal (Stationary)*	–	–	–	–	3.190	–	–	–	1.073	0.525	–	0.731	116.994	0.826
95	*Doiar trap*	2.991	49.896	–	–	–	–	–	2.027	0.262	1.167	–	–	78.287	0.552
105	*Dharma jal*	–	–	–	–	–	–	–	–	–	3.500	–	–	76.280	0.538
222	*Polo*	–	–	–	–	–	–	–	–	–	2.245	–	–	48.918	0.345
291	*Urani*	–	–	–	–	–	–	–	1.795	–	–	–	–	21.191	0.150
296	*Tukri*	–	4.394	–	–	–	–	–	–	–	–	–	–	0.568	0.004
314	*Boat Katha*	0.108	–	–	–	–	–	–	–	–	–	–	–	–	–
		100	100	100	100	100	100	100	100	100	100	100	100	14171.982	100

Notes 1. No fishing activities were observed during surveys in May 1993

2. – denotes zero catch

Table 6.4 Percentage monthly canal catch by gear type: inside FCD (site SW04)

Gear Code	Gear name	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
266	*Veshal*	–	–	–	–	–	–	14.626	71.384	79.643	49.738	5.214	–	–	4778.346	31.067
45	*Ber jal*	–	25.695	25.393	–	–	–	–	–	–	17.239	36.938	–	18.261	3283.307	21.347
164	*Jhaki jal*	39.373	56.829	7.673	23.553	–	–	–	22.843	17.871	15.310	17.871	17.919	53.852	2625.663	17.071
298	*Akra*	–	–	–	–	–	–	–	–	–	4.937	10.687	41.355	3.648	1171.262	7.615
95	*Doiar trap*	39.932	–	58.684	71.243	95.613	100.000	1.111	–	2.041	1.842	0.264	13.271	2.808	859.453	5.588
307	*Hand fishing*	–	–	–	–	–	–	–	–	–	3.021	9.526	1.246	–	712.436	4.632
270	*Katha*	–	17.450	–	–	–	–	–	–	–	3.857	2.639	23.056	16.280	646.412	4.203
222	*Polo*	–	–	–	–	–	–	–	–	–	–	9.417	–	–	463.078	3.011
255	*Thella jal*	5.807	–	–	–	–	–	40.748	–	0.232	1.206	5.981	3.153	–	444.646	2.891
30	*Sip*	6.008	0.026	8.250	3.258	–	–	–	–	0.213	2.353	1.076	–	0.716	252.923	1.644
88	*Current jal (Stationary)*	–	–	–	1.946	4.387	–	–	5.773	–	0.498	0.386	–	4.435	105.045	0.683
202	*Moi jal*	–	–	–	–	–	–	36.695	–	–	–	–	–	–	32.240	0.210
263	*Ucha*	–	–	–	–	–	–	6.821	–	–	–	–	–	–	5.993	0.039
296	*Tukri*	8.880	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		100	100	100	100	100	100	100	100	100	100	100	100	100	15380.804	100

Note: – denotes zero catch

veshal accounted for about half the total catch, the remainder being taken mainly by *ber jal* and *jhaki jal*. The peak catch of November resulted, in part from increased fishing effort of the dominant gears particularly *veshal*, although *ber jal* and *jhaki jal* expended greater effort in December and October respectively (Fig. 6.6). The increased catch could also be attributed to the substantial increase in catch rate of *veshal* and to a lesser extent, *ber jal* (Fig. 6.7). During the winter months, fishing patterns again differed from those observed outside the scheme. In December, *ber jal* provided the bulk of the catch while in January and February, *akra* and *jhaki jal* predominated.

6.3 Statistical Comparison of Catch Rates Inside and Outside the FCD Project

Statistical analyses of seasonally pooled catch rates of gears used inside and outside the FCD scheme were carried out following the methods described in Final Report, Appendix 1. The underlying assumption of these methods is that once differences in catchabilities between gears is accounted for then any further differences in catch rates inside and outside the FCD scheme are due solely to differences in fish densities.

At the inside site, Bogail *Khal*, over 90% of the total catch per kilometre for the period March 1993 to February 1994, excluding *katha* and *kua*, was taken by six gears. At the outside site, Rajandi *Khal*, over 90% of the total catch per kilometre over the same period was taken by five gears. In all, seven gears were used in the statistical analysis of catch rates, as listed in Table 6.5. Four gears appeared in both lists: *veshal*, *jhaki jal*, *hand fishing* with dewatering and *ber jal*. *Veshal* took 32% of the catch per kilometre at the inside sites, and 50% at the outside sites. A total of 231 individual catch rate observations was used in this analysis.

Comparison of the seasonally pooled catch rates by gear between inside and outside sites indicated that the main assumptions of statistical analysis were reasonably satisfied. There was generally good agreement between observed and predicted catch rates, except for *veshal* at the outside sites in season 5, *jhaki jal* in season 3 at both inside and outside sites, and for *ber jal* in season 4 at both inside and outside sites, where there were discrepancies. Only in one case could these discrepancies not be traced to single or small numbers of catch rate observations. Repeating the statistical analysis with these small numbers of observations removed resulted in almost no change in the parameter estimates or significance levels of the various tests, so the discrepancies did not bias the results.

Figure 6.2 Percentage of total monthly catch taken by dominant gears: canal site SW08 (outside FCD)

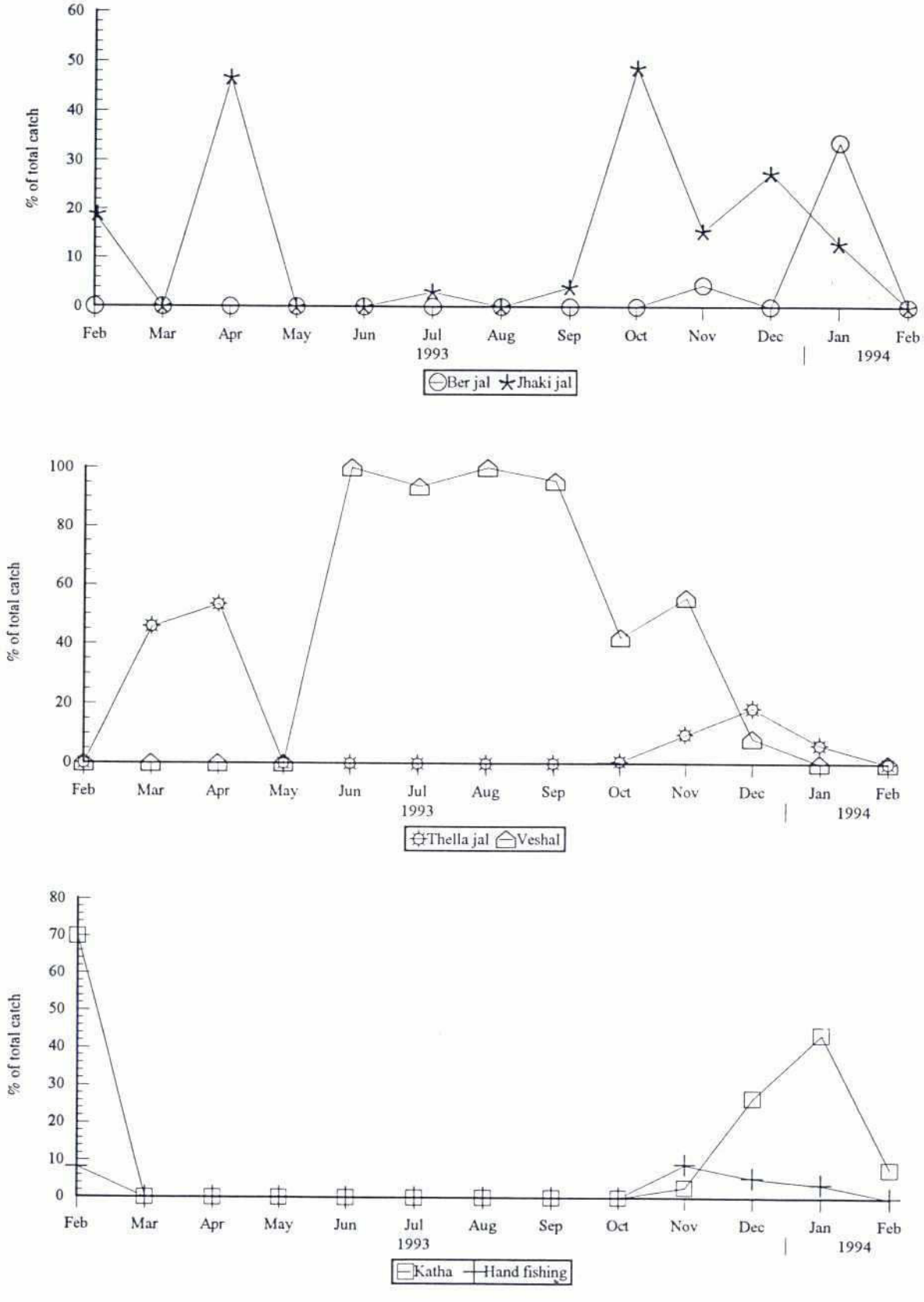
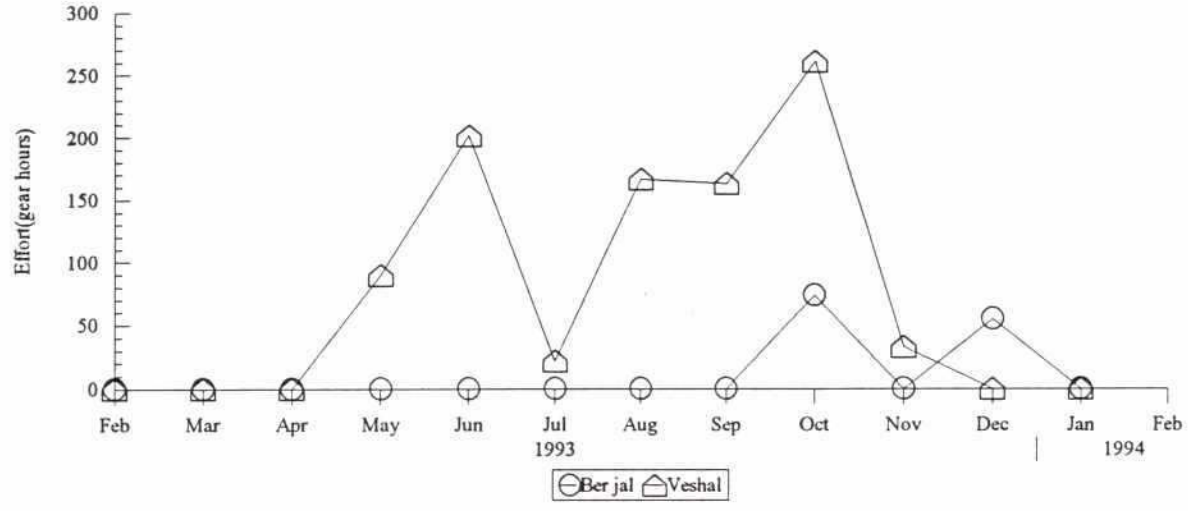
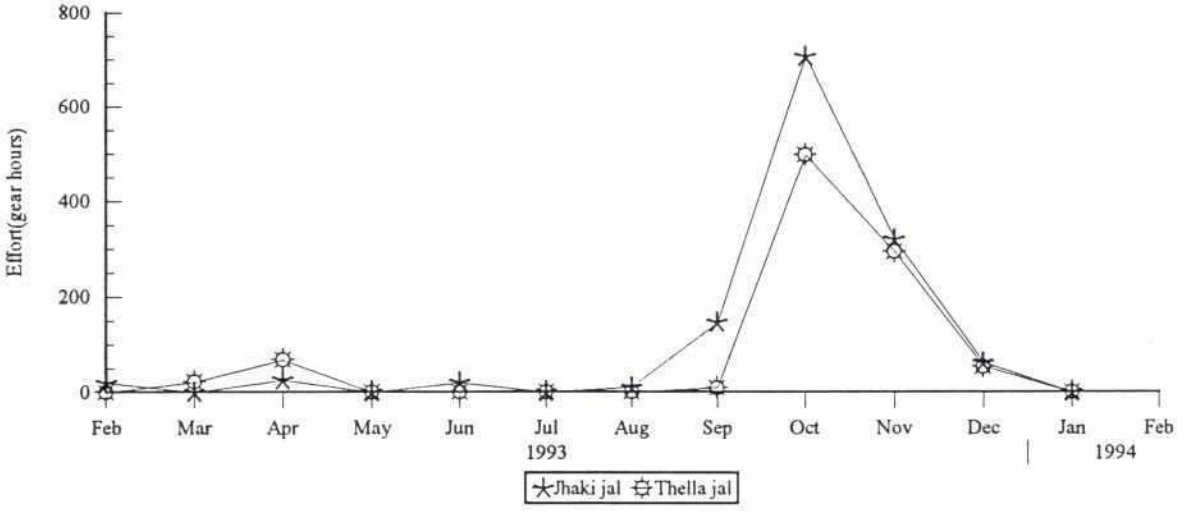


Figure 6.3 Total monthly fishing effort per kilometre of canal by dominant gears: site SW08 (outside FCD)





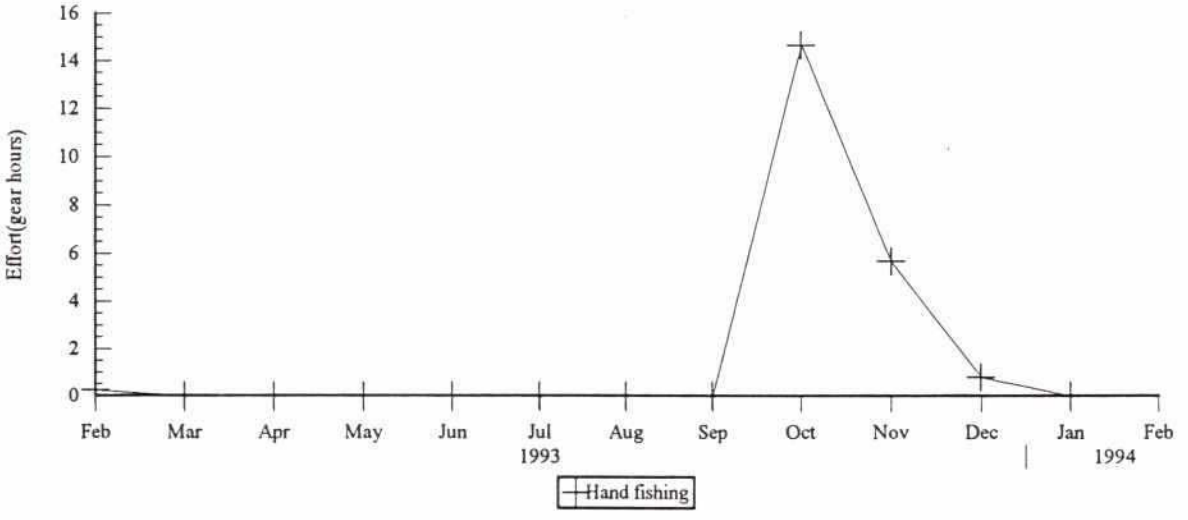
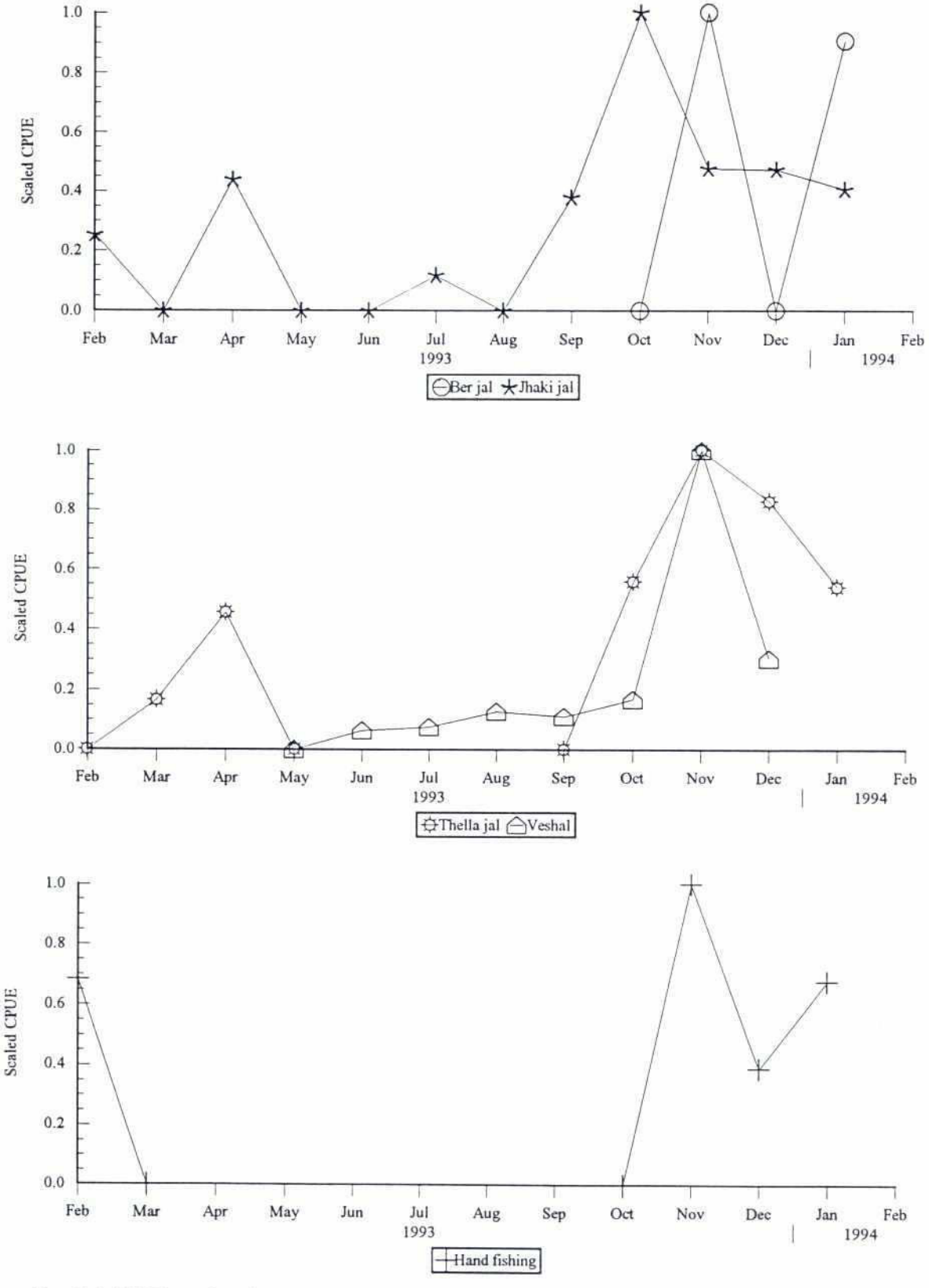
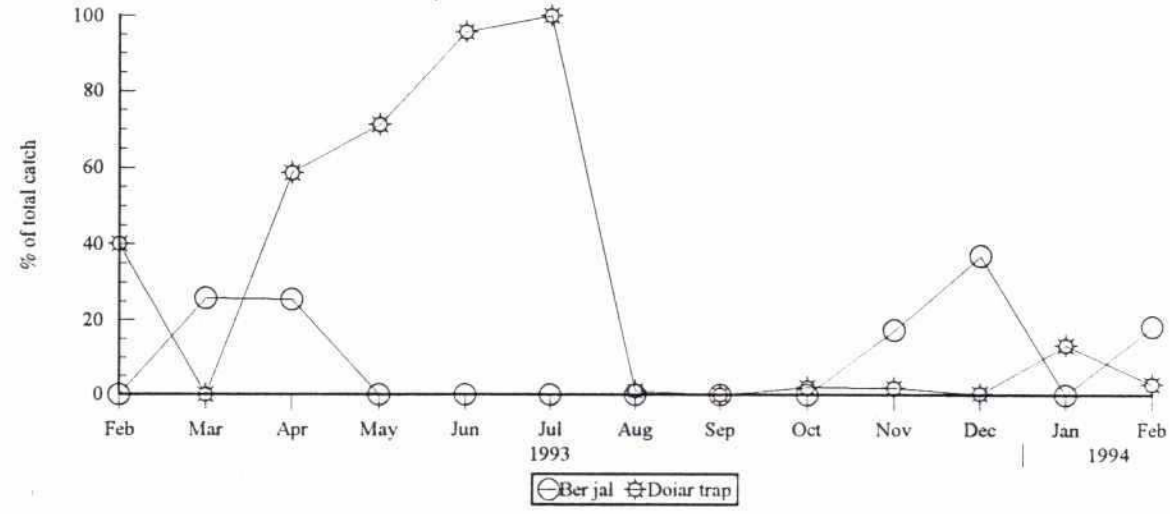


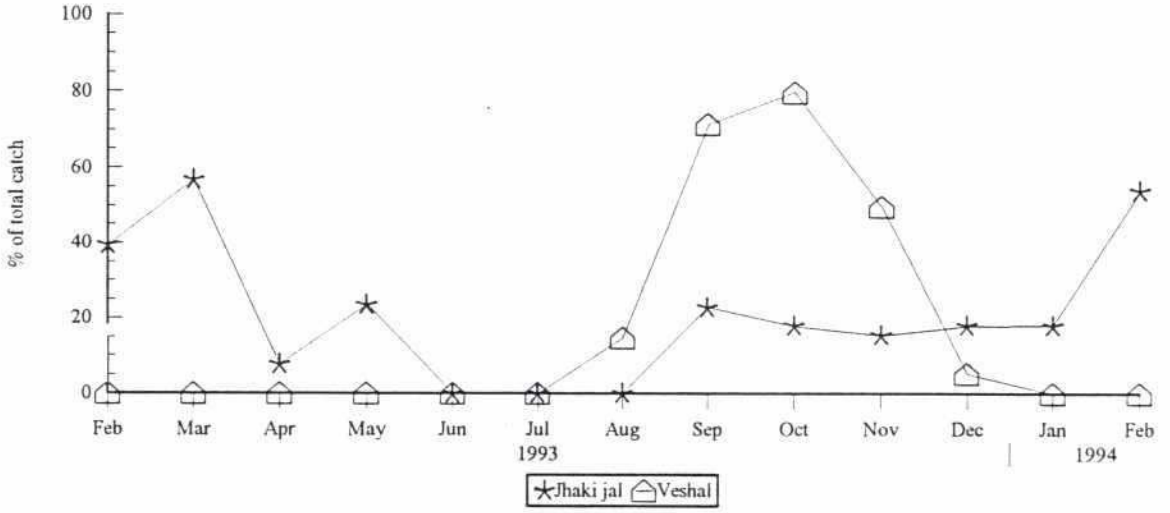
Figure 6.4 Scaled CPUE of dominant gears: canal site SW08 (outside FCD)



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

Figure 6.5 Percentage of total monthly catch taken by dominant gears: canal site SW04 (inside FCD)





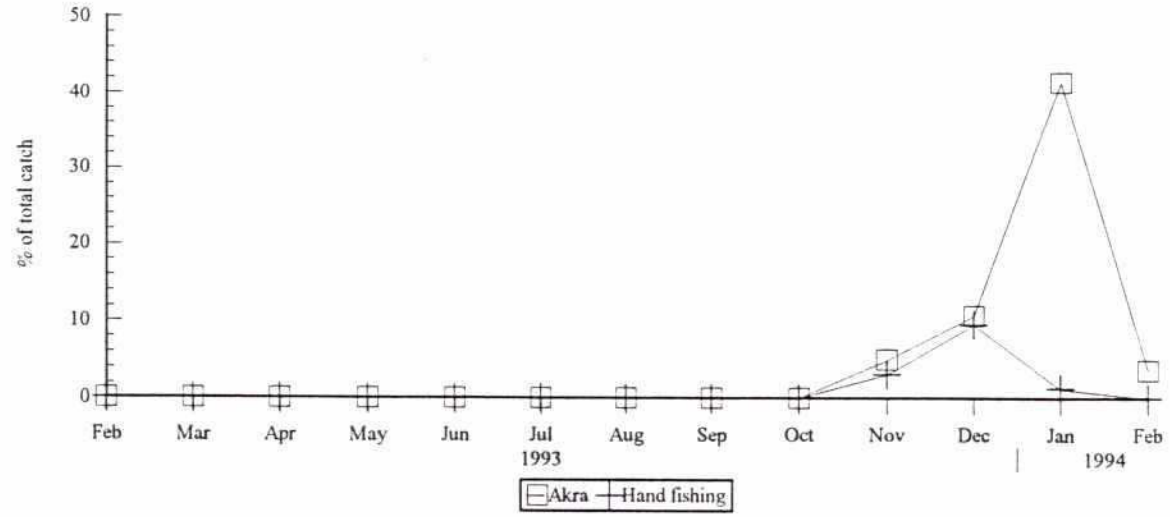
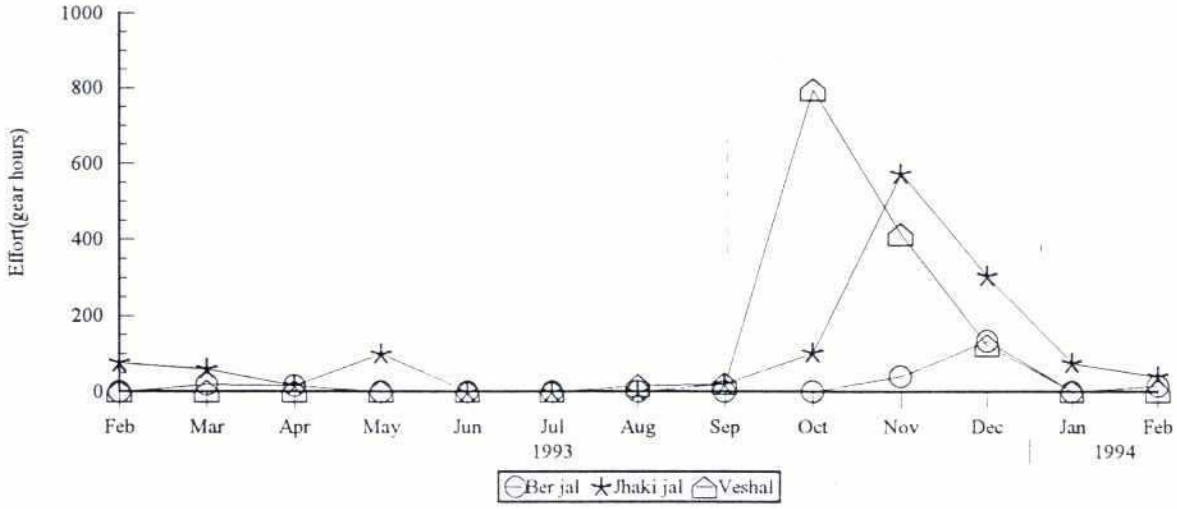
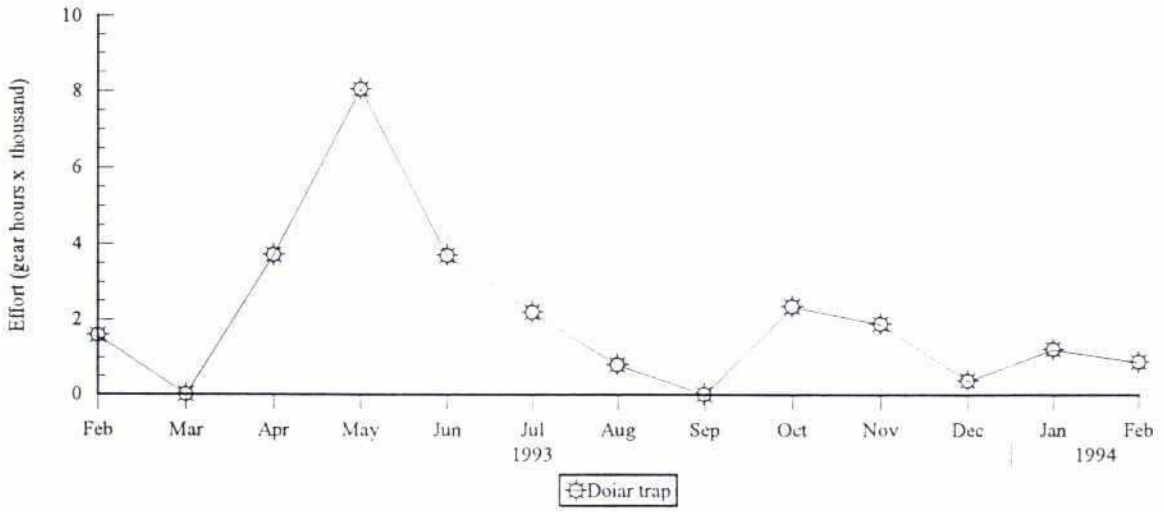


Figure 6.6 Total monthly fishing effort per kilometre of canal by dominant gears: site SW04 (inside FCD)





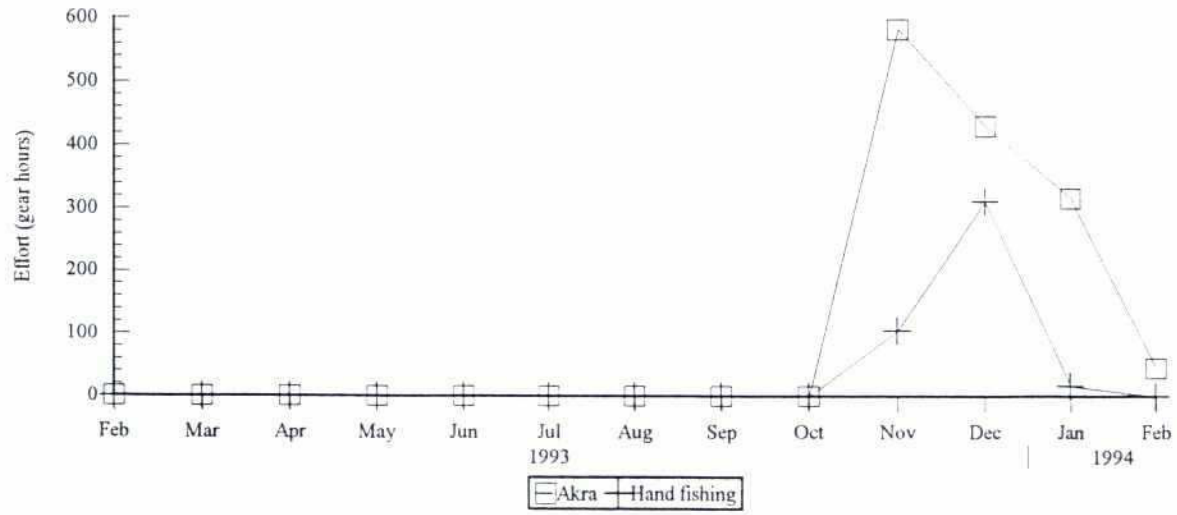
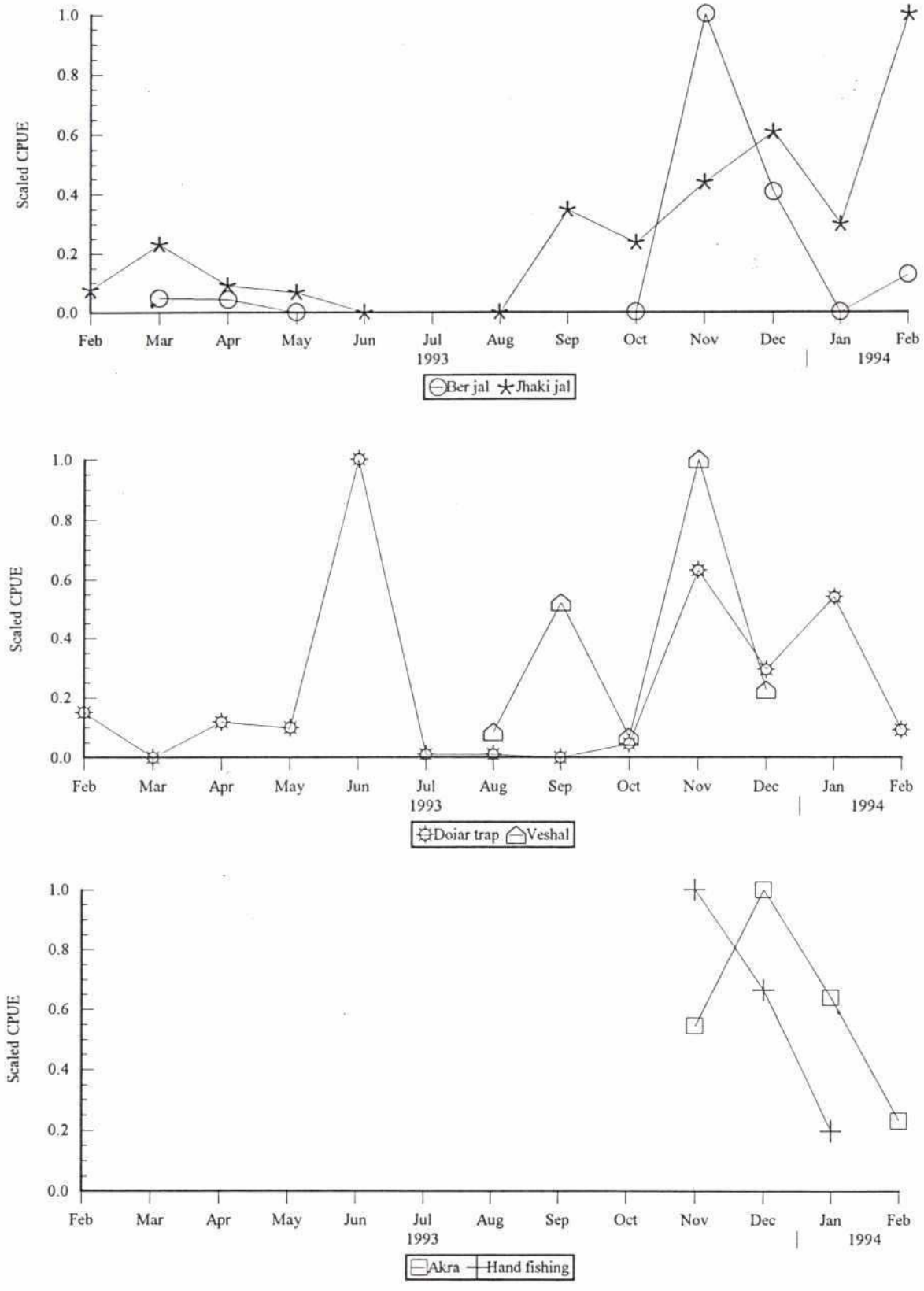


Figure 6.7 Scaled CPUE of dominant gears: canal site SW04 (inside FCD)



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded.

Table 6.5 Comparison of the total catch (kg/km) by dominant gears used in canals outside and inside the Chatla - Fukurhati Project, March 1993 - February 1994

		SEASON																	
		March-April			May-June			July-Sept			Oct-Nov			Dec-Feb					
		1			2			3			4			5			TOTAL		
GEAR		Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Sum Pred	Pred Out
OUTSIDE	*Jhaki jal*	9.4	6.1		0.0	0.0		3.9	5.0		450.4	453.1		148.2	223.9		612.0	688.1	
	Veshal	0.0	0.0		22.2	22.2		144.7	147.0		507.8	489.0		39.1	23.4		713.8	681.7	
	Hand fishing	0.0	0.0		0.0	0.0		0.0	0.0		164.4	175.5		31.0	48.5		195.4	224.0	
	Ber jal	0.0	0.0		0.0	0.0		0.0	0.0		81.4	370.5		54.7	132.1		136.1	502.6	
	Thella jal	11.2	11.2		0.0	0.0		0.0	0.0		171.7	171.7		92.7	92.7		275.6	275.6	
TOTAL		20.7	17.3		22.2	22.2		148.6	152.0		1375.7	1659.7		365.7	520.7		1932.9	2371.9	
STD ERR			4.8			8.9			28.3			212.2			86.5			231.1	
INSIDE	*Jhaki jal*	15.2	18.1	18.1	6.7	6.7	6.7	9.0	3.4	3.4	361.3	359.5	359.5	547.6	397.6	397.6	939.8	785.3	785.3
	Veshal	0.0	0.0	0.0	0.0	0.0	0.0	16.2	14.1	14.1	1377.4	1393.6	1393.6	683.7	856.1	856.1	2077.3	2263.8	2263.8
	Hand fishing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.5	49.0	49.0	38.1	30.7	30.7	101.6	79.7	79.7
	Ber jal	14.7	14.7	14.7	0.0	0.0	0.0	0.0	0.0	0.0	361.9	202.5	202.5	126.7	97.4	97.4	503.4	314.6	314.6
	Akra	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	103.6	103.6	103.6	164.1	164.1	164.1	267.8	267.7	267.7
	Doiar trap	14.3	14.3	14.3	152.1	152.1	152.1	1.0	1.0	1.0	60.1	60.1	60.1	30.8	30.8	30.8	258.2	258.2	258.2
TOTAL		44.2	47.1	47.1	158.8	158.8	158.8	26.2	18.5	18.5	2327.8	2168.3	2168.3	1591.0	1576.7	1576.7	4148.0	3969.4	3969.4
STD ERR			23.5	23.5		87.0	87.0		3.0	3.0		257.5	257.5		467.0	467.0		540.9	540.9

Note: Obs = observed catches; Pred = catches predicted by statistical model; Pred out = Catches inside the scheme predicted using effort levels from outside the scheme

Parameter estimates measuring the seasonal differences in underlying density of fish at the inside and outside sites indicated a lower density at the inside sites in season 1, and higher densities at the inside sites in seasons 2, 3, 4 and 5. Only the comparison for season 5 approached statistical significance at the 5% level when each was considered individually. Taken together, no significant difference was found in fish densities at inside and outside sites ($p > 0.27$).

Total annual catches per kilometre by the seven gears were very much higher at the inside site than at the outside site (Table 6.5). However, given the lack of significant differences in fish densities between inside and outside sites detected by the statistical analysis, this is due solely to higher levels of fishing effort expended at the inside site. Estimates of standardised effort per kilometre, summed across all seven gears and seasons, were derived from the statistical analysis. For the inside site, the total standardised effort (measured in *jhaki jal* hours per kilometre) was 9,406, compared with 5,765 for the outside site. Observed and predicted catches per kilometre are shown in Table 6.5.

6.4 Biodiversity and Catch Composition

6.4.1 Species richness

A total of 59 fish species was recorded from Rajandi *Khal* outside the scheme compared with a slightly higher total of 63 species from Bogail *Khal* inside it. Seasonal variations in species diversity followed somewhat different patterns in each canal (Fig. 6.8). Lowest numbers of species were generally recorded during the pre-monsoon months of 1993 in both canals. However, diversity increased sharply in July in Rajandi *Khal* and, apart from a temporary decrease in August, remained around the same level (32-38 species) until January and February 1994 when diversity once again declined. In contrast, diversity progressively increased in Bogail Khal to reach a maximum in November coinciding with the peak catch before decreasing slightly during the winter months.

6.4.2 Catch composition

The percentage contribution to the total annual canal catches made by dominant species are presented in Table 6.6 More detailed monthly catch compositions for each site are given in Table 6.7 and 6.8. In all tables, species are divided into three categories based on habitat preference: a) riverine, b) migratory and c) floodplain resident (see section 5.1.2 for definitions).

Table 6.6 Percentage contribution (by weight) to the annual catch by dominant species from canals outside and inside the Chatla–Fukurhati Project, March 1993 – February 1994

Habitat Preference	Species name		Rajandi Khal SW08(Outside)	Bogail Khal SW04(Inside)
	Scientific	Bengali		
Migratory	*Aorichthys aor*	*Ayre*	–	3.3
	Catla catla	*Catla*	1.4	–
	Labeo rohita	*Rui*	2.0	1.3
	Notopterus chitala	*Chital*	–	1.6
Subtotal			3.3	6.1
Floodplain Resident	*Anabas testudineus*	*Koi*	–	1.1
	Mystus tengara	*Bajari tengra*	–	1.0
	Mystus vittatus	*Tengra*	5.5	8.2
	Colisa fasciatus	*Khalisha*	3.8	5.4
	Colisa lalia	*Lal khalisha*	3.5	–
	Xenentodon cancila	*Kaikka*	9.7	1.6
	Puntius conchonius	*Canchan puti*	3.7	2.6
	Puntius sophore	*Puti*	22.8	16.9
	Puntius ticto	*Tit puti*	7.2	3.9
	Rasbora daniconius	*Darkina*	4.1	–
	Glossogobius giurus	*Bailla*	1.2	2.9
	Lepidocephalus guntea	*Gutum*	5.1	1.3
	Channa marulius	*Gajar*	–	1.4
	Channa punctatus	*Taki*	6.8	14.4
	Channa striatus	*Shol*	2.5	3.8
	Heteropneustes fossilis	*Shingi*	1.1	2.2
	Macrognathus aculeatus	*Tara baim*	–	2.4
	Macrognathus pancalus	*Guchi*	3.8	7.4
	Mastacembelus armatus	*Baral baim*	–	1.4
	Nandus nandus	*Bheda*	2.1	–
	Notopterus notopterus	*Foli*	–	1.4
	Tetraodon cutcutia	*Potka*	1.8	1.2
Subtotal			84.4	80.6
Other	Prawn spp.	*Chingri/Icha*	3.7	3.8
Grand total			91.4	90.4

Notes: 1. Dominant species defined as those species contributing 1% or more by weight to the total annual catch

2. Shaded values highlight the most abundant species(>4%)

3. See text for definitions of habitat preference categories (section 5.1.2)

Table 6.7 **Monthly catch composition from canal (% by weight):outside FCD (site SW08)**

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
18	Riverine	*Barilius barna*	*Bani koksa*	–	–	–	–	–	–	–	–	–	0.533	–	–	11.612	0.082
	Subtotal			–	–	–	–	–	–	–	–	–	0.5328	–	–	11.612	0.0819
130	Migratory	*Aorichthys aor*	*Ayre*	–	–	–	–	–	–	–	0.926	0.373	0.007	–	–	43.038	0.304
24		*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	–	–	–	0.170	0.965	0.007
131		*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	–	0.333	–	–	7.262	0.051
132		*Mystus cavasius*	*Kabashi*	–	–	–	–	–	–	–	–	–	0.500	–	–	10.898	0.077
32		*Catla catla*	*Catla*	–	–	–	–	–	–	6.833	–	1.960	–	–	–	192.074	1.355
47		*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	1.545	1.902	2.733	0.180	–	–	–	–	17.364	0.123
48		*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	1.238	0.432	–	–	–	–	9.482	0.067
100		*Labeo bata*	*Bata*	–	–	–	–	–	–	0.079	–	–	–	–	–	0.281	0.002
102		*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	0.160	–	–	–	–	1.886	0.013
107		*Labeo rohita*	*Rui*	–	–	–	–	12.800	–	0.238	2.366	2.512	–	–	–	281.923	1.989
188		*Salmostoma bacaila*	*Katari*	–	–	–	–	0.218	1.208	–	–	–	–	–	–	1.265	0.009
189		Salmostoma phulo	*Fulchela*	–	–	–	–	0.175	–	–	–	–	–	–	–	0.518	0.004
86		*Gudusia chapra*	*Chapila*	–	–	–	–	0.078	–	–	–	–	–	–	–	0.231	0.002
169		*Pseudeutropius atherinoides*	*Batasi*	0.088	–	–	–	0.895	2.101	0.094	0.347	0.005	–	–	–	8.625	0.061
209		*Wallagu attu*	*Boal*	–	–	–	–	3.333	–	–	–	1.067	0.170	0.678	–	110.155	0.777
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	3.876	1.735	–	–	–	–	34.208	0.241
216		*Nemacheilus zonalternans*		–	–	–	–	–	–	–	–	–	0.013	–	–	0.274	0.002
	Subtotal			0.088	–	–	–	19.044	5.211	15.092	6.146	5.917	1.023	0.678	0.170	720.449	5.084
6	Floodplain	*Anabas testudineus*	*Koi*	1.089	–	–	1.274	1.146	–	0.519	0.359	0.393	1.966	0.872	3.528	114.045	0.805
136	Resident	*Mystus tengara*	*Bajari tengra*	0.383	–	–	3.500	0.505	0.772	0.527	2.266	0.234	0.205	5.868	1.137	109.918	0.776
137		*Mystus vittatus*	*Tengra*	8.017	1.640	2.306	2.143	2.798	1.716	2.768	1.963	3.382	11.172	10.857	19.884	775.786	5.474
55		*Colisa fasciatus*	*Khalisha*	12.273	–	1.672	1.632	5.455	–	0.507	0.211	3.032	9.255	3.589	3.857	534.512	3.772
211		*Colisa labiosus*	*Khalisha*	0.098	3.287	0.070	0.346	–	1.128	–	0.062	0.390	0.833	1.256	0.036	63.516	0.448
56		*Colisa lalia*	*Lal khalisha*	2.442	0.657	0.183	–	–	–	–	–	5.572	0.937	–	0.510	500.880	3.534
57		*Colisa sota*	*Khalisha*	0.082	2.019	0.355	0.272	0.293	–	–	–	0.071	–	–	–	7.864	0.055
210		*Xenentodon cancila*	*Kaikka*	–	–	1.462	13.150	9.235	20.667	31.080	18.114	11.494	0.396	–	0.024	1370.315	9.669
187		*Osteobrama cotio cotio*	*Keti*	–	–	–	–	0.338	–	–	–	–	–	0.299	0.096	3.825	0.027
175		*Puntius conchonius*	*Canchan puti*	1.533	3.133	0.113	10.104	1.093	3.669	1.720	8.760	3.325	2.839	4.241	2.454	518.697	3.660
176		*Puntius gelius*	*Giliputi*	–	0.657	–	–	0.020	–	0.949	–	0.027	–	–	–	5.816	0.041
179		*Puntius sarana*	*Sarputi*	–	–	–	–	0.188	–	–	–	–	–	–	–	0.559	0.004
180		*Puntius sophore*	*Puti*	6.260	1.222	1.715	12.442	8.325	8.952	8.982	17.863	23.982	25.049	33.350	15.125	3227.544	22.774
212		*Puntius ticto*	*Tit puti*	1.790	4.092	4.312	1.224	2.702	1.831	2.166	3.970	9.526	4.070	4.758	0.895	1015.527	7.166
183		*Rasbora elanga*	*Sephatia*	–	–	–	–	–	–	–	0.079	–	–	–	–	0.935	0.007
5		*Amblypharyngodon mola*	*Mola*	0.177	–	0.781	6.201	1.610	3.708	0.383	0.147	–	–	0.275	0.172	20.046	0.141
68		*Danio devario*	*Chebli*	0.227	–	–	–	0.196	–	0.045	–	0.118	–	–	–	10.850	0.077
75		*Esomus danricus*	*Darkina*	1.244	8.865	–	–	0.113	–	0.105	–	0.111	0.064	–	–	12.777	0.090
182		*Rasbora daniconius*	*Darkina*	0.112	–	5.349	2.571	1.881	1.403	0.109	2.348	5.856	0.814	1.230	1.166	577.606	4.076
83		*Glossogobius giurus*	*Bailla*	7.397	–	0.309	1.740	3.483	3.645	5.846	6.803	0.576	–	0.375	0.185	168.541	1.189
91		*Hypophthalmichthys molitrix*	*Silver carp*	–	–	–	–	2.753	7.638	0.303	0.868	–	–	–	–	23.399	0.165
110		*Lepidocephalus guntea*	*Gutum*	10.528	9.816	8.113	3.150	5.208	1.609	2.438	1.435	6.088	5.692	1.268	2.543	723.795	5.107
9		*Aplocheilus panchax*	*Kanpona*	–	–	0.355	–	–	–	–	–	–	0.030	–	–	0.988	0.007

Note: – denotes zero catch

(Cont.)

Table 6.7 Monthly catch composition from canal (% by weight):outside FCD (site SW08)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
39		*Channa marulius*	*Gajar*	–	–	–	–	–	–	0.447	2.039	0.524	1.232	–	0.202	98.536	0.695
40		*Channa orientalis*	*Cheng*	–	–	–	–	–	–	–	–	–	0.900	–	–	19.609	0.138
41		*Channa punctatus*	*Taki*	4.785	–	0.871	0.751	2.801	0.494	0.233	2.302	4.802	13.552	15.024	18.148	962.714	6.793
42		*Channa striatus*	*Shol*	–	–	–	–	0.961	–	–	–	1.643	8.370	0.737	4.096	354.906	2.504
49		*Clarias batrachus*	*Magur*	–	–	–	–	–	–	–	–	–	0.335	–	–	7.293	0.051
88		*Heteropneustes fossilis*	*Shingi*	1.952	–	0.993	0.612	0.490	1.831	–	–	0.196	2.240	1.300	12.943	153.028	1.080
121		*Macrognathus aculeatus*	*Tara baim*	2.933	0.843	1.153	0.927	0.170	–	0.460	0.336	0.187	0.450	0.459	47.030	0.332	
123		*Macrognathus pancalus*	*Guchi*	24.273	0.990	3.238	5.408	4.897	–	5.113	17.889	1.498	3.632	1.393	11.726	537.438	3.792
122		*Mastacembelus armatus*	*Baral baim*	–	–	–	–	–	–	1.789	–	0.262	0.068	–	–	30.259	0.214
138		*Nandus nandus*	*Bheda*	–	–	–	0.362	–	–	2.609	0.647	2.316	1.746	6.126	0.316	302.265	2.133
15		*Badis badis*	*Napit koi*	0.073	1.222	0.070	–	0.059	–	0.030	–	0.243	0.022	–	–	21.805	0.154
148		*Ompok pabda*	*Madhu pabda*	0.236	–	–	4.437	4.119	7.808	–	–	0.014	0.387	0.203	0.174	33.037	0.233
145		*Notopterus notopterus*	*Foli*	–	–	–	–	–	0.418	1.093	1.301	0.440	0.400	–	–	65.905	0.465
203		*Tetraodon cutcutia*	*Potka*	–	–	0.426	0.331	0.947	1.441	0.800	2.217	2.271	0.767	0.478	0.054	248.513	1.754
33		*Chaca chaca*	*Cheka*	–	–	–	–	–	–	–	–	0.052	0.014	–	–	4.724	0.033
35		*Chanda baculis*	*Chanda*	–	–	–	–	–	0.301	–	0.020	–	0.026	–	–	0.949	0.007
36		*Chanda nama*	*Nama chanda*	0.117	–	–	4.925	1.228	2.361	0.681	0.543	0.920	0.065	–	–	99.002	0.699
37		*Chanda ranga*	*Lal chanda*	1.949	7.758	3.670	1.477	0.713	0.580	2.644	0.195	1.134	0.034	1.071	–	126.180	0.890
	Subtotal			89.967	46.202	37.515	129.976	63.726	71.972	73.884	92.860	90.828	97.299	95.019	99.731	12900.934	91.031
998	Others	Unidentified fish		–	–	–	–	–	–	–	–	–	0.134	–	–	2.911	0.021
931		Prawn spp.	*Chingri/Icha*	9.944	53.798	62.485	21.024	17.230	22.817	11.023	0.994	3.120	1.010	4.303	0.098	524.508	3.701
945		*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	0.135	–	–	–	11.570	0.082
	Subtotal			9.944	53.798	62.485	21.024	17.230	22.817	11.023	0.994	3.255	1.144	4.303	0.098	538.989	3.803
	Grand total			100	100	100	151	100	100	100	100	100	100	100	100	14171.984	100

Note: – denotes zero catch

Table 6.8 Monthly catch composition from canal(% by weight):inside FCD (site SW04)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
139	Riverine	*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	0.633	0.008	–	–	–	4.667	0.030
28		*Botia dario*	*Rani*	–	–	–	–	–	–	0.057	–	0.220	0.036	–	–	–	4.290	0.028
58		*Corica soborna*	*Kachki*	–	–	–	–	–	–	0.228	–	–	–	–	–	–	0.200	0.001
193		*Setipinna phasa*	*Phasa*	–	–	–	–	–	–	–	6.348	1.161	–	–	–	–	16.694	0.109
2		*Ailia coila*	*Kajuli*	–	–	–	–	–	–	3.046	15.055	4.316	–	–	–	–	52.277	0.340
51		*Clupisoma garua*	*Ghaura*	–	–	–	–	–	–	5.019	10.960	14.663	–	–	–	–	114.293	0.743
196		Silonia silondia	*Shillong*	–	–	–	–	–	–	–	–	0.256	0.007	–	–	–	2.172	0.014
81		*Gagata youssoufi*	*Gang tengra*	–	–	–	–	–	–	–	–	0.220	–	–	–	–	1.407	0.009
155		*Pama pama*	*Poa*	–	–	–	–	–	–	–	–	–	0.259	–	–	–	20.261	0.132
	Subtotal			–	–	–	–	–	–	8.350	32.363	21.468	0.309	–	–	–	216.261	1.406
130	Migratory	*Aorichthys aor*	*Ayre*	–	–	–	–	–	–	–	–	6.639	5.872	–	–	–	502.339	3.266
24		*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	–	–	–	0.009	–	0.053	0.0003
131		*Mystus bleekeri*	*Golsha tengra*	–	–	–	2.369	–	–	–	–	–	0.564	0.003	0.400	–	49.933	0.325
132		*Mystus cavasius*	*Kabashi*	–	–	–	0.366	–	–	–	–	0.158	0.399	2.150	–	–	138.481	0.900
32		*Catla catla*	*Catla*	–	–	–	–	–	–	–	14.119	7.889	0.362	–	0.395	–	101.838	0.662
47		*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	–	–	1.479	0.044	–	–	0.178	13.540	0.088
48		*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	–	0.362	7.766	0.248	0.013	0.081	–	70.800	0.460
100		*Labeo bata*	*Bata*	–	–	–	–	–	–	–	0.398	–	0.011	–	0.051	–	1.757	0.011
101		*Labeo boga*	*Bhangan*	–	–	–	–	–	–	–	–	–	–	–	0.009	–	0.052	0.0003
102		*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	–	2.219	0.106	0.001	–	–	22.525	0.146
107		*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	20.766	7.908	1.304	0.029	1.347	0.140	192.991	1.255
188		*Salmostoma bacaila*	*Katari*	–	–	–	–	–	–	–	–	0.133	–	–	–	–	0.853	0.006
189		*Salmostoma phulo*	*Fulchela*	–	–	–	–	–	–	–	2.604	–	–	–	–	–	3.799	0.025
86		*Gudusia chapra*	*Chapila*	–	–	–	–	–	–	0.080	5.860	0.700	0.010	–	–	–	13.907	0.090
76		*Eutropiichthys vacha*	*Bacha*	–	–	–	–	–	–	–	5.773	0.271	–	–	–	–	10.159	0.066
169		*Pseudeutropius atherinoides*	*Batasi*	–	–	–	3.846	–	–	–	–	–	–	–	–	–	5.207	0.034
209		*Wallagu attu*	*Boal*	–	–	–	–	–	–	–	–	–	0.542	–	2.211	–	55.595	0.361
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	3.047	–	–	–	238.630	1.551
	Subtotal			–	–	–	6.582	–	–	0.080	49.882	35.161	12.510	2.195	4.503	0.318	1422.459	9.248
6	Floodplain	*Anabas testudineus*	*Koi*	–	–	–	–	0.222	–	–	–	–	1.444	0.920	0.866	0.287	165.555	1.076
136	Resident	*Mystus tengara*	*Bajari tengra*	–	2.659	–	7.688	–	–	–	–	–	0.197	2.390	0.114	3.389	158.976	1.034
137		*Mystus vittatus*	*Tengra*	23.608	12.360	26.441	6.517	4.420	–	–	0.435	3.549	4.927	14.517	7.971	7.058	1263.095	8.212
55		*Colisa fasciatus*	*Khalisha*	–	2.659	–	4.633	–	–	–	–	0.593	7.832	3.777	1.338	0.770	822.900	5.350
211		*Colisa labiosus*	*Khalisha*	–	0.751	–	6.295	3.225	–	–	0.108	–	–	0.015	0.096	0.370	27.257	0.177
56		*Colisa lalia*	*Lal khalisha*	–	–	–	–	–	–	2.495	–	–	0.185	0.366	1.118	0.064	41.577	0.270
57		*Colisa sota*	*Khalisha*	1.646	–	0.504	–	–	–	2.396	–	–	0.065	0.015	0.429	–	10.938	0.071
210		*Xenentodon cancila*	*Kaikka*	1.757	3.926	0.411	–	–	–	–	–	–	2.486	0.636	1.326	2.301	246.834	1.605
187		*Osteobrama cotio cotio*	*Keti*	–	–	–	0.178	–	–	2.366	3.202	2.342	0.347	0.070	0.015	–	52.740	0.343
175		*Puntius conchonius*	*Canchan puti*	5.975	2.425	1.178	0.536	1.019	–	1.126	0.615	1.273	3.761	1.206	1.083	5.788	399.888	2.600

Note: – denotes zero catch

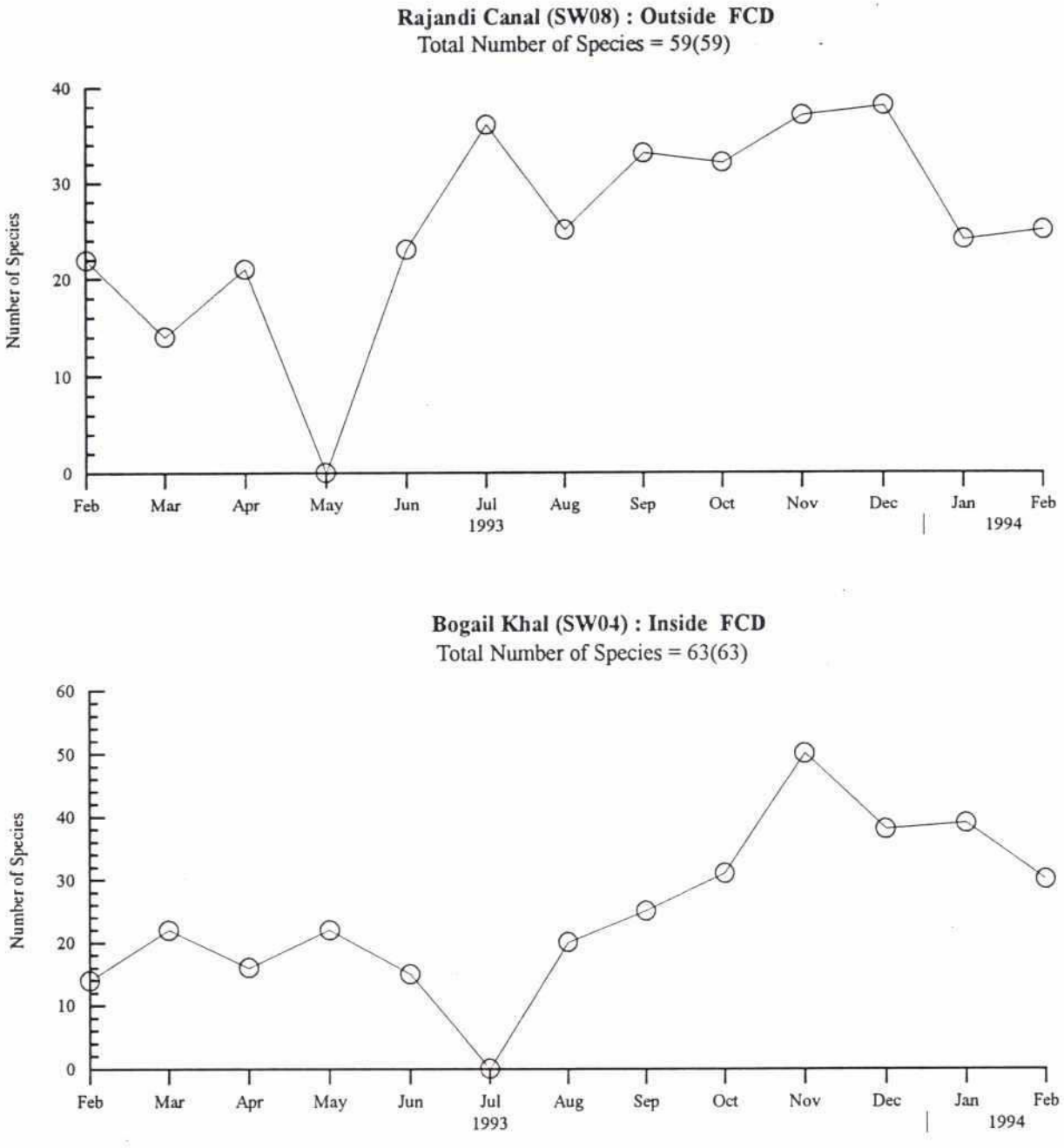
(Cont.)

Table 6.8 Monthly catch composition from canal(% by weight):inside FCD (site SW04)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
176		*Puntius gelius*	*Giliputi*	–	–	–	–	–	–	–	–	–	–	0.000	–	–	0.009	0.0001
180		*Puntius sophore*	*Puti*	18.432	16.705	0.699	4.671	24.798	–	0.182	0.652	–	22.411	10.862	11.576	29.055	2603.152	16.925
212		*Puntius ticto*	*Tit puti*	1.400	1.419	2.469	3.591	–	–	5.733	–	–	6.212	1.974	0.376	2.008	606.608	3.944
5		*Amblypharyngodon mola*	*Mola*	–	12.728	–	–	2.291	–	0.799	–	0.079	0.201	0.021	0.078	0.074	44.280	0.288
68		*Danio devario*	*Chebli*	–	–	0.044	3.122	–	–	–	–	–	0.026	–	–	–	6.310	0.041
75		*Esomus danricus*	*Darkina*	–	–	12.420	5.918	11.878	–	–	–	–	0.329	–	0.570	0.093	104.244	0.678
182		*Rasbora daniconius*	*Darkina*	2.302	2.114	–	0.892	15.270	–	0.249	–	–	0.033	0.012	0.666	–	82.411	0.536
83		*Glossogobius giurus*	*Bailla*	3.199	1.665	3.390	3.305	0.611	–	0.148	1.158	11.801	2.649	2.652	1.891	2.953	449.164	2.920
110		*Lepidocephalus guntea*	*Gutum*	3.568	2.656	12.696	12.241	3.478	–	1.152	0.543	0.138	1.034	1.037	1.968	2.070	201.045	1.307
39		*Channa marulius*	*Gajar*	–	–	–	–	–	–	–	–	2.514	0.815	1.541	0.142	17.709	218.412	1.420
41		*Channa punctatus*	*Taki*	7.500	9.703	–	–	5.000	–	0.706	0.543	4.535	10.670	24.746	14.314	3.842	2216.321	14.410
42		*Channa striatus*	*Shol*	–	–	–	–	–	–	–	–	–	1.807	8.945	0.200	0.751	585.189	3.805
49		*Clarias batrachus*	*Magur*	–	0.667	–	–	–	–	–	–	–	0.071	0.009	0.328	0.564	10.676	0.069
88		*Heteropneustes fossilis*	*Shingi*	9.583	7.005	8.248	–	0.297	–	–	–	–	2.204	1.745	8.876	1.742	334.410	2.174
121		*Macrognathus aculeatus*	*Tara baim*	–	1.716	4.269	3.081	–	–	1.326	–	0.395	1.976	4.072	0.417	1.272	375.646	2.442
123		*Macrognathus pancalus*	*Guchi*	12.816	4.999	6.593	14.588	–	–	–	0.905	1.522	5.201	10.312	27.299	5.939	1140.409	7.414
122		*Mastacembelus armatus*	*Baral baim*	–	0.314	0.210	–	–	–	–	–	3.926	1.719	0.666	2.059	0.781	208.048	1.353
138		*Nandus nandus*	*Bheda*	–	–	–	–	0.090	–	–	–	–	0.598	0.456	–	1.661	75.457	0.491
15		*Badis badis*	*Napit koi*	4.151	0.053	–	1.086	–	–	–	–	–	0.012	0.023	–	–	3.604	0.023
148		*Ompok pabda*	*Madhu pabda*	–	6.217	–	–	–	–	–	–	–	0.396	0.099	0.443	0.388	47.105	0.306
145		*Notopterus notopterus*	*Foli*	–	1.016	–	–	–	–	–	–	–	2.372	0.700	0.018	–	221.490	1.440
203		*Tetraodon cutcutia*	*Potka*	–	0.117	–	–	–	–	0.216	0.652	1.344	0.882	2.057	1.003	1.057	189.730	1.234
33		*Chaca chaca*	*Cheka*	–	–	–	–	–	–	–	–	–	1.157	–	–	–	90.593	0.589
35		*Chanda baculis*	*Chanda*	0.171	–	–	1.695	–	–	–	0.073	–	0.084	0.004	0.140	0.765	12.680	0.082
36		*Chanda nama*	*Nama chanda*	–	–	3.029	2.837	–	–	0.046	–	0.277	0.761	0.068	0.042	0.012	71.625	0.466
37		*Chanda ranga*	*Lal chanda*	–	–	0.612	2.062	1.102	–	1.340	–	–	0.621	0.138	0.731	0.031	69.530	0.452
	Subtotal			96.108	93.874	83.212	137.937	73.700	–	20.279	8.884	34.288	85.481	96.051	87.491	92.793	13157.908	85.548
931	Others	Prawn spp.	*Chingri/Icha*	3.892	6.125	16.787	8.482	26.300	100.000	71.292	8.871	9.082	1.698	1.754	8.006	6.889	584.187	3.798
				100	100	100	153	100	100	100	100	100	100	100	100	100	15380.815	100

Note: – denotes zero catch

Figure 6.8 Seasonal variation in the number of fish species recorded from canals outside and inside the Chatla-Fukurhati Project , February 1993 - February 1994



Notes:
1. Annual total number of species recorded between March 1993 and February 1994 given in parentheses
2. No fishing activities were observed at SW08 in May
3. Fishing activities observed at SW04 in July comprised doiar traps which captured prawns only

Floodplain resident species dominated the canal catches both outside the scheme (91%) and inside (86%). Migratory species were proportionately twice as abundant inside the scheme (9%) compared to outside it (5%). Similarly, riverine species contributed less than 0.1% of the catch from Rajandi *Khal* but comprised 1.4% of the total catch from Bogail *Khal* (Table 6.9).

Table 6.9 Percentage contribution of riverine, migratory and floodplain resident fish species to the total annual catches outside and inside FCD projects in the South West Region, March 1993 - February 1994

FCD Project	Site code	In/Out FCD	Site name	% Annual Catch		
				Riverine	Migratory	Floodplain resident
Chatla-Fukurhati	SW08	Out	Rajandi *Khal*	<0.1	5.0	91.0
	SW04	In	Bogail *Khal*	1.4	9.2	85.5
Satla-Bagda Polder 1	SW12	Out	Kalabari *Khal*	<0.1	3.2	94.2
	SW20	In	Ambola *Khal*	<0.1	4.0	83.8

The composition of dominant floodplain species was generally similar inside and outside the Chatla-Fukurhati scheme although there were differences in the relative importance of individual species between sites (Table 6.6). Puti (*P. sophore*) was the most abundant fish in catches from both canals while *kaikka*, *tit puti*, *gutum* and *darkina* were relatively more abundant in Rajandi *Khal* and *taki*, *tengra* and *guchi* were more common in Bogail *Khal*. Prawns were taken in similar proportions (4%) in both canals. The compositions of dominant species recorded in the catches from comparable canals inside and outside Satla-Bagda Polder 1 (Supporting Volume No. 2) were very similar to those found in this study but again some differences were seen in the relative abundance of individual species.

Only one riverine species was recorded from Rajandi *Khal* compared with nine found in Bogail *Khal* (Table 6.10). No riverine species comprised 1% or more of the total annual catch. However, examination of monthly catches revealed that three species, *kajuli*, *ghaura* and *phasa* were particularly important during the flood drawdown in September and October when overall catches still remained low (Table 6.8).

A total of 16 migratory species was recorded in Rajandi *Khal* compared with 18 from Bogail *Khal*. Most species were uncommon and only two, *catla* and *rui* comprised more 1% of the

annual catch in Rajandi *Khal* and three, *ayre*, *rui* and *chital* in Bogail *Khal* (Table 6.6). The total numbers of riverine and migratory species recorded inside and outside the Chatla-Fukurhati Project were higher than those recorded in both Satla-Bagda Polder 1 and the adjacent free flooding area of Bagihar *Beel* (Table 6.10). The composition of the dominant migratory species also differed between the two studies. In the Satla-Bagda and Bagihar *Beel* study only one species, *boal*, comprised 1% or more of the annual canal catch.

Table 6.10 Total annual number of fish species, classified by habitat preference, recorded from canals in the South West Region, March 1993 - February 1994

FCD Project	Site Code	In/out FCD	Number of Species			Total
			Riverine	Migratory	Floodplain Resident	
Chatla-Fukurhati	SW08	Out	1	17	41	59
	SW04	In	9	18	36	63
Satla-Bagda Polder 1	SW12	Out	1	9	36	46
	SW20	In	2	9	40	51

7 FLOODPLAIN FISHERIES

7.1 Total Catch

7.1.1 Pattern of catch

Ignoring differences in the absolute size of catches, seasonal patterns of catch were generally similar at sites inside and outside the FCD scheme (Figs. 7.1 and 7.2). The bulk of the total annual catch at each site was captured between November and December 1993 (65% outside, 57% inside). This coincided broadly with the flood drawdown when catches rose sharply reaching a peak in December at all sites except SW09 where the maximum catch was recorded during November. Catches rose only slightly in October when both water levels and flood extent decreased rapidly. From December onwards catches decreased progressively but at varying rates between sites until February 1994. Lowest catches were recorded from all sites during the dry pre-monsoon months from March to May 1993. At sites inside the FCD, no fishing activities were observed in March at SW05 and at both sites (SW05 and SW06) during April.

Examination of pattern of fishing between individual sites revealed the same relationship inside and outside the FCD: a greater proportion of the annual catches was taken later in the year, particularly between December and January, from lower-lying sites (SW06 and SW10).

The seasonal patterns of catches recorded from sites in the Chatla-Fukurhati study were similar to those from Satla-Bagda Polder 1 and Bagihar *Beel* (Supporting Volume No. 2). In the latter study, higher proportions of the annual catch were captured later in the year, up to February 1994 from those sites covering the deepest areas of *beel*. Variations in seasonal catch trends between sites could be attributed to differences in flood duration. The low-lying sites were flooded for a longer period and therefore, not surprisingly, supported fisheries later in the season when catchabilities increased due to the concentration of fish into decreasing areas of water.

In the Chatla-Fukurhati study, there was evidence that the duration of the flood was shortened inside the scheme during December by two to four weeks compared to the flooding pattern outside it (Section 3.3). Although this had no negative effect on the absolute value of the December catch inside the FCD scheme compared with that out it (53 kg/ha and 46 kg/ha, respectively), the relative value of the catch outside was slightly higher (41%) than that inside (37%).

Figure 7.1 Seasonal variation in catch per unit area from individual floodplain sites outside and inside the Chatla-Fukurhati Project, February 1993-February 1994

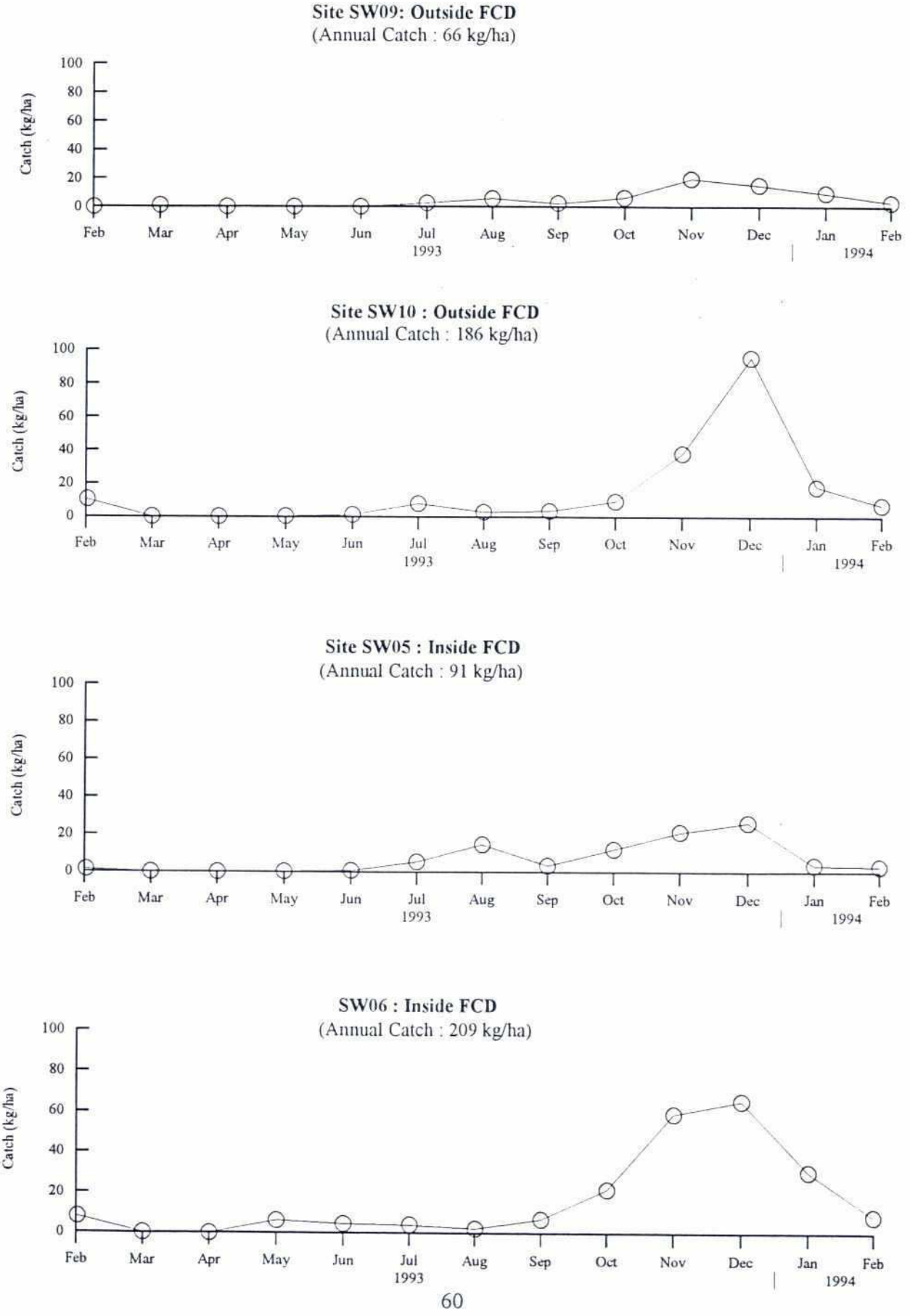
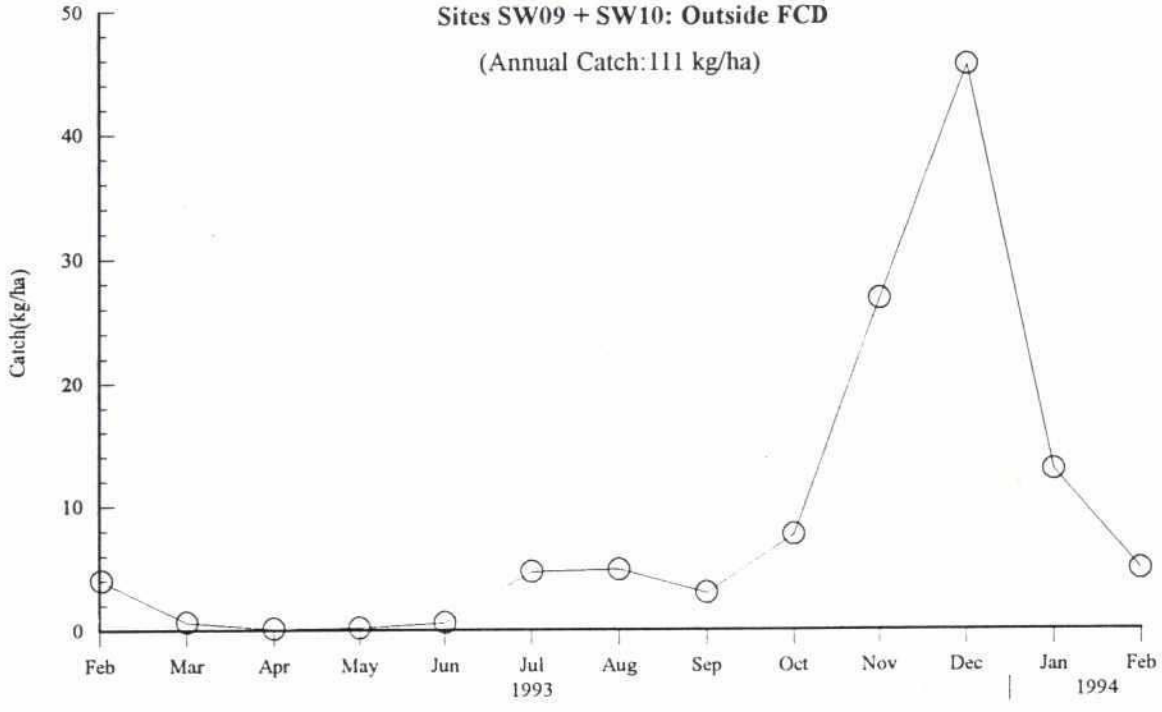
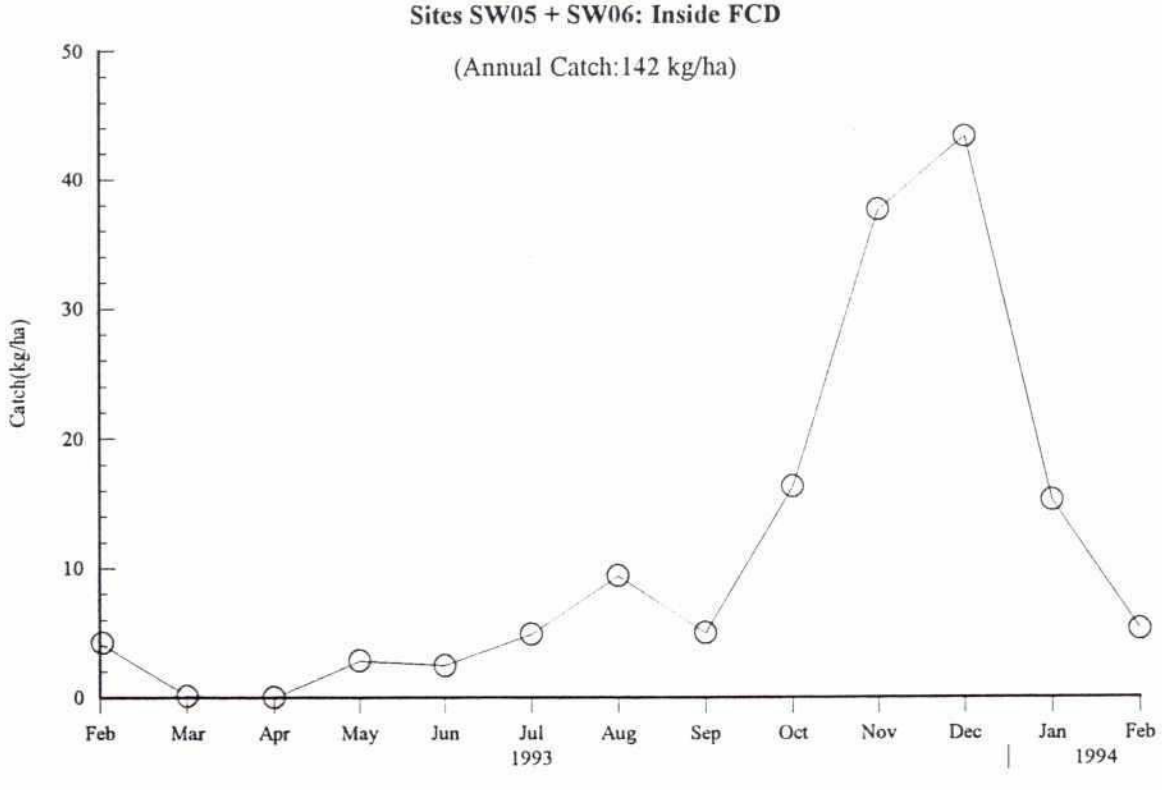


Figure 7.2 Seasonal variation in catch per unit area from combined floodplain sites outside and inside the Chatla-Fukurhati Project, February 1993 - February 1994





7.1.2 Size of catch

Annual catch per unit area (kg/ha) from the combined areas of two sites for the period March 1993 to February 1994 was 28% higher inside the FCD scheme than outside (Table 7.1). This compares with a 36% higher catch per kilometre from canals inside the scheme.

Table 7.1 Annual catch from individual floodplain sites outside and inside the Chatla-Fukurhati Project, March 1993 - February 1994

Andolir *Beel* (outside FCD)				Chatla-Fukurhati (inside FCD)			
Site	Total catch (kg)	Area (ha)	Catch per unit area (kg/ha)	Site	Total catch (kg)	Area (ha)	Catch per unit area (kg/ha)
SW09	11969	180.9	66	SW05	15661	171.7	91
SW10	20536	110.7	186	SW06	27145	130.0	209
Total	**32505**	**291.6**	**111**	**Total**	**42806**	**301.7**	**142**

Note: Values of catch are rounded to nearest whole number

Sites with a greater proportion of low-lying areas generated substantially higher yields per unit area both inside and outside the FCD. This pattern was also clearly seen on floodplains inside the Satla-Bagda Polder and in the free-flooding Bagihar *Beel* about 20-50 km to the south of the present study areas. The estimated annual catch per unit area from Bagihar *Beel* was considerably higher (215 kg/ha) than yields recorded inside and outside the Chatla-Fukurhati study (Table 7.2). The differences can be attributed to the larger area of perennial water on Bagihar *Beel* where the bulk of the annual catch was taken between December 1993 and February 1994.

Table 7.2 Comparison of total annual catch per unit area (kg/ha) from combined areas of floodplain sites in the South West Region, March 1993 - February 1994

FCD Project	In/Out FCD	Catch per unit area (kg/ha)
Chatla- Fukurhati Project	Out	111
	In	142
Satla - Bagda Polder 1	Out	215
	In	122

7.2 Pattern of Fishing

7.2.1 Catch by gear

Percentage contributions to the total annual catch made by dominant gears are presented in Table 7.3. More detailed information on the percentage monthly catch of all observed gears is provided in Tables 7.4 and 7.5.

Kua accounted for the highest proportion of annual catches both inside and outside the FCD. *Kua* are designed to attract fish during the flood drawdown by offering the last remaining aquatic refuge on the floodplain. *Kua* fishing started at those sites located on higher ground (SW05 and SW09) in November, and at those on lower ground (Sites SW06 and SW10) a month later. *Kua* provided the total floodplain catch from inside the FCD during January and February and 87% of the January catch and all the February catch from floodplains outside the scheme (Tables 7.4 and 7.5). By their very nature, *kuas* are normally owned by land owners/farmers who frequently hire professional fishermen to fish for a share of the catch. On the adjacent floodplains of Chanda *Beel*, where large-scale stocking of carp has been carried out by the Third Fisheries Project each year since 1991, the number of *kua* excavated increased by at least 30% in 1992 from a baseline density of 0.32/ha, in an effort by landowners to capture a greater share of the stocked fish. The number of *kua* recorded on the floodplains inside and outside the Chatla-Fukurhati Project represent lower baseline densities (0.16/ha and 0.11/ha respectively) in the absence of stock enhancement programmes. These compare with values of 0.25/ha inside the Satla-Bagda Polder 1 and 0.57/ha in the free-flooding Bagihar *Beel*, which are also areas not yet directly influenced by carp stocking programmes and therefore also serve as baseline estimates. Bagihar *Beel* has been identified by the Third Fisheries Project as an area for stocking in 1995.

Kua captured an almost identical share of the annual catch from sites inside (41%) and outside (42%) the Chatla-Fukurhati Project. Other important gears used outside the scheme comprised *current jal*, *thella jal*, and *polo* traps. In contrast, passive-set *doiar* traps caught a much higher proportion of the catch from inside the scheme so too did *ber jal* used on the open waters. Socio-economic surveys carried out in neighbouring villages confirmed the greater abundance of these gears inside the FCD scheme (Supporting Volume No. 15). *Veshal* also accounted for a higher proportion of the catch inside the scheme possibly as a result of the more rapid flood drawdown with higher water velocities favouring the deployment of this gear on the floodplain.

Table 7.3 Percentage contribution (by weight) to the total annual catch made by dominant[1] gears in floodplains outside and inside the Chatla-Fukurhati Project, March 1993 - February 1994

Gear name	Outside FCD (Sites SW09+SW10)	Inside FCD (Sites SW05+SW06)
Kua	42.2	41.1
Current jal (Stationary)	21.1	12.0
Thella jal	10.4	5.7
Polo	9.1	-
Sip	4.6	-
Jhaki jal	2.9	-
Doiar trap	-	20.5
Ber jal	-	8.7
Veshal	-	4.3

Note: 1. Dominant gears are defined as those gears which when ranked in order of abundance, comprised at least 90% of the annual catch

7.2.2 Catch by gear by month

During the pre-monsoon months of February and March 1993, *kua* captured most of the catch (87-92%) from floodplains outside the FCD scheme. This fishery ended in March when catches were very low (Figs. 7.1 and 7.2). During the next three months catches remained low and were taken mainly by *jhaki jal* in April, *doiar* and *thella jal* in May and *current jal* in June when water levels rose sharply (Fig. 7.3). During full flood conditions from July to September, catches were dominated by a mixture of hooks (*sip* and *daun*), *current jal* and, in July only, *doiar* traps. As water levels on the floodplain dropped rapidly in October, catches rose only slightly and were taken mainly by *current jal* (69%), *thella jal* (12%) and *veshal* (10%). During November when water levels had decreased substantially and fish were concentrated into smaller areas, catches rose precipitously in response to the use of small-scale gears such as *current jal* and *thella jal* and through the start of *kua* fishing on higher ground. The principal factor contributing to the sudden catch increase was the increased effort of *current jal* (Fig. 7.4) and the high catches from the first *kua* fishing (Fig. 7.5). Catches continued to rise in December largely as a result of greater numbers of *kua* being fished, including those on lower-lying land. At the same time fishing effort on the small residual waterbodies by *polo* traps and *thella jal* reached a peak. Catch rates of *polo* also

Table 7.4 Percentage monthly floodplain catch by gear type: outside FCD (sites SW09+SW10)

Gear Code	Gear name	Year: 1993											Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
302	*Kua*	91.636	81.761	–	–	–	–	–	–	–	27.301	51.041	86.980	100.000	13706.114	42.166
88	*Current jal(Stationary)*	–	–	–	3.661	80.414	28.542	28.691	58.282	68.639	44.512	3.148	0.059	–	6849.520	21.072
255	*Thella jal*	4.171	–	–	41.573	7.799	0.638	–	–	11.979	14.482	13.068	5.874	–	3394.113	10.442
222	*Polo*	–	–	–	–	–	–	–	–	–	3.532	20.083	0.615	–	2962.764	9.115
30	*Sip*	–	–	13.416	–	10.164	41.395	39.643	19.464	8.724	0.052	–	–	–	1508.901	4.642
164	*Jhaki jal*	3.568	18.239	86.584	–	–	–	–	–	1.469	5.042	3.270	0.717	–	951.491	2.927
263	*Ucha*	–	–	–	–	–	–	–	–	–	1.026	4.283	1.004	–	685.744	2.110
95	*Doiar trap*	–	–	–	54.765	–	28.024	3.639	–	0.484	0.870	0.908	–	–	661.708	2.036
307	*Hand fishing*	0.173	–	–	–	–	–	–	–	–	0.403	2.403	1.418	–	403.330	1.241
170	*Juti*	–	–	–	–	–	–	–	1.344	1.073	1.337	1.796	0.386	–	392.478	1.207
272	*Daun*	–	–	–	–	–	–	12.874	6.750	1.725	0.237	–	–	–	296.311	0.912
266	*Veshal*	–	–	–	–	–	–	2.382	10.923	3.916	–	–	–	–	214.743	0.661
45	*Ber jal*	–	–	–	–	–	–	6.602	–	–	–	–	1.929	–	165.168	0.508
123	*Koi jal*	–	–	–	–	–	–	0.313	2.384	1.043	1.136	–	–	–	136.709	0.421
278	*Nol barsi*	–	–	–	–	–	1.401	5.856	0.852	0.949	0.069	–	–	–	135.395	0.417
296	*Tukri*	0.452	–	–	–	1.624	–	–	–	–	–	–	0.608	–	25.472	0.078
270	*Katha*	–	–	–	–	–	–	–	–	–	–	–	0.412	–	15.400	0.047
		100	100	100	100	100	100	100	100	100	100	100	100	100	32505.359	100

Note: – denotes zero catch

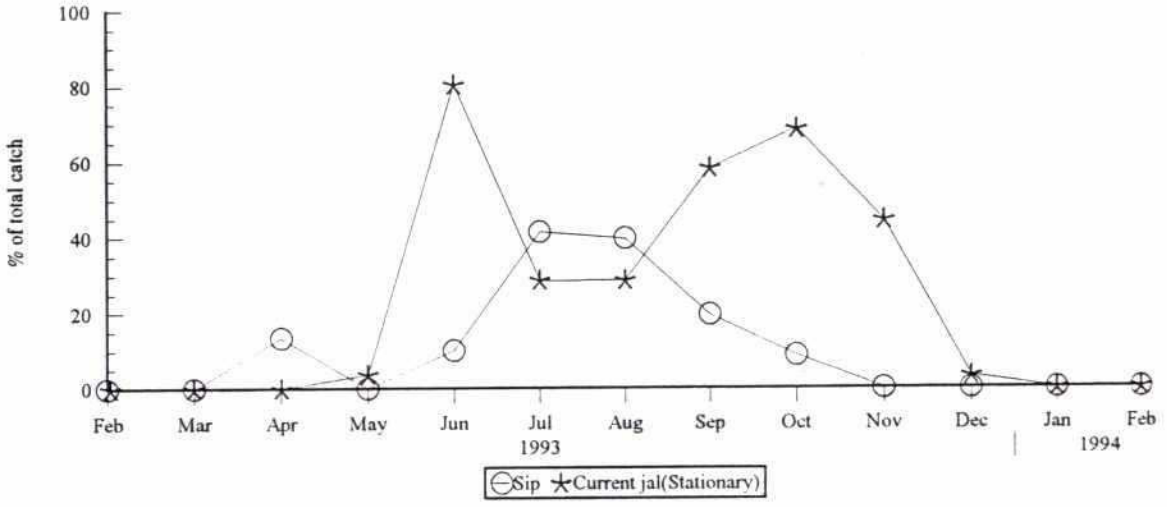
Table 7.5 Percentage monthly floodplain catch by gear type: inside FCD (sites SW05+SW06)

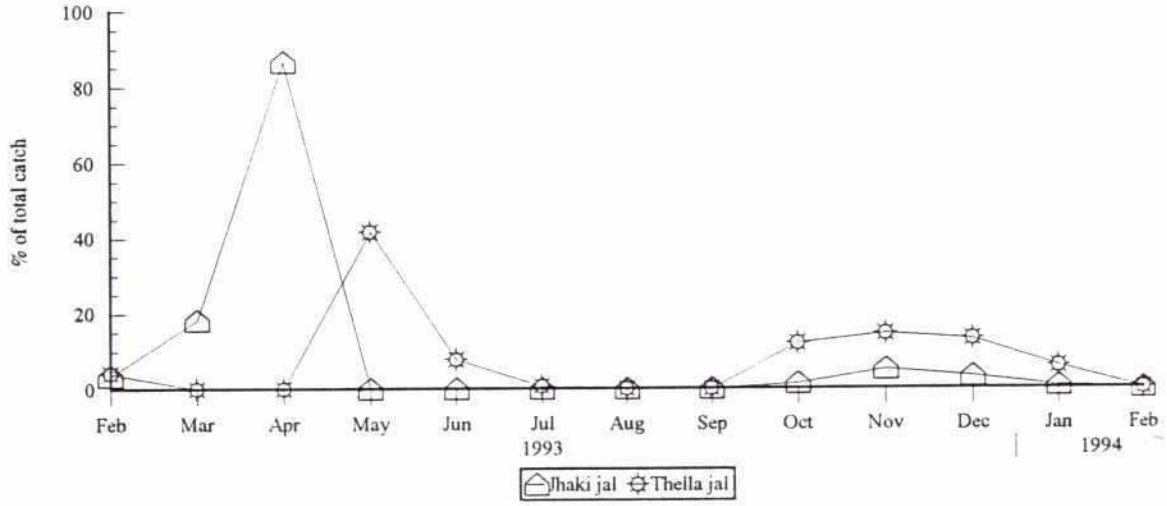
Gear Code	Gear name	Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Feb	Mar	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
302	*Kua*	100.000	–	–	–	–	–	–	–	8.560	80.478	100.000	100.000	17595.920	41.105
95	*Doiar trap*	–	–	99.302	67.603	42.189	69.446	0.340	1.148	32.024	8.893	–	–	8774.302	20.497
88	*Current jal(Stationary)*	–	–	0.128	28.747	31.198	7.995	37.748	47.046	10.058	1.592	–	–	5115.403	11.950
45	*Ber jal*	–	–	–	0.105	14.608	7.467	20.462	10.014	19.126	2.492	–	–	3710.632	8.668
255	*Thella jal*	–	–	–	–	–	1.878	13.403	14.326	11.169	1.689	–	–	2439.451	5.699
266	*Veshal*	–	–	–	–	–	1.035	20.382	15.909	6.441	–	–	–	1843.062	4.306
164	*Jhaki jal*	–	–	–	–	–	–	–	0.397	6.404	1.088	–	–	885.279	2.068
222	*Polo*	–	–	–	–	–	–	–	–	3.086	2.364	–	–	656.701	1.534
272	*Daun*	–	–	–	3.545	9.845	9.040	2.814	1.228	1.025	–	–	–	644.539	1.506
263	*Ucha*	–	–	0.570	–	–	2.898	4.777	6.442	0.310	–	–	–	509.328	1.190
307	*Hand fishing*	–	100.000	–	–	–	–	–	–	0.758	0.462	–	–	181.602	0.424
296	*Tukri*	–	–	–	–	–	–	–	–	–	0.941	–	–	122.515	0.286
170	*Juti*	–	–	–	–	–	–	–	2.334	–	–	–	–	114.461	0.267
97	*By hand/Dewatering*	–	–	–	–	–	–	–	–	0.759	–	–	–	85.855	0.201
123	*Koi jal*	–	–	–	–	–	–	0.073	1.156	0.190	–	–	–	79.263	0.185
30	*Sip*	–	–	–	–	2.160	0.241	–	–	0.090	–	–	–	48.624	0.114
		100	100	100	100	100	100	100	100	100	100	100	100	42806.945	100

Notes: 1. – denotes zero catch

2. No fishing was observed in April 1993

Figure 7.3 Percentage of total monthly catch taken by dominant gears: floodplain sites SW09 + SW10 (outsite FCD)





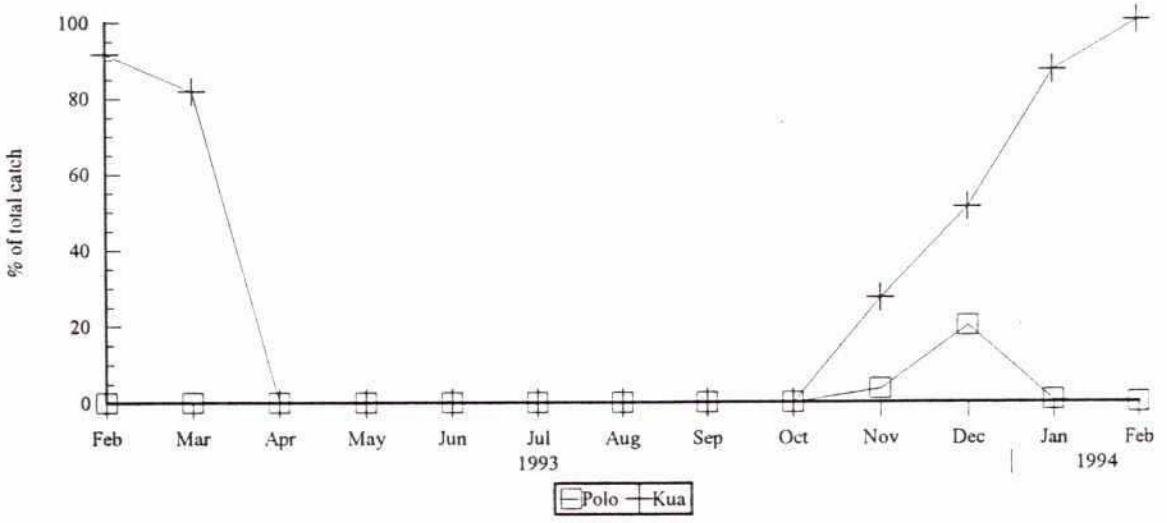
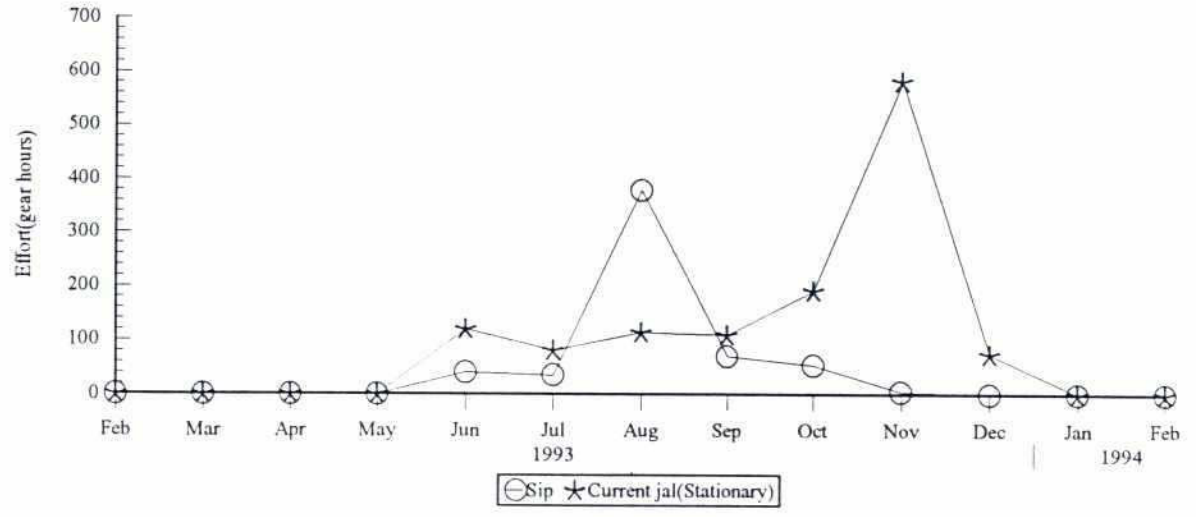
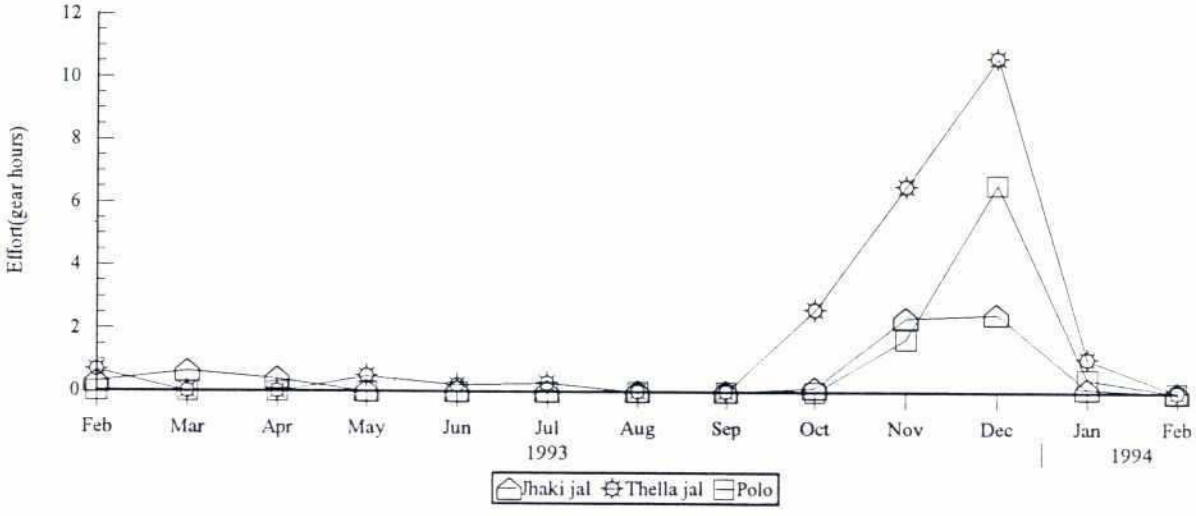


Figure 7.4 Total monthly fishing effort per hectare by dominant gears: floodplain sites SW09 + SW10 (outside FCD)





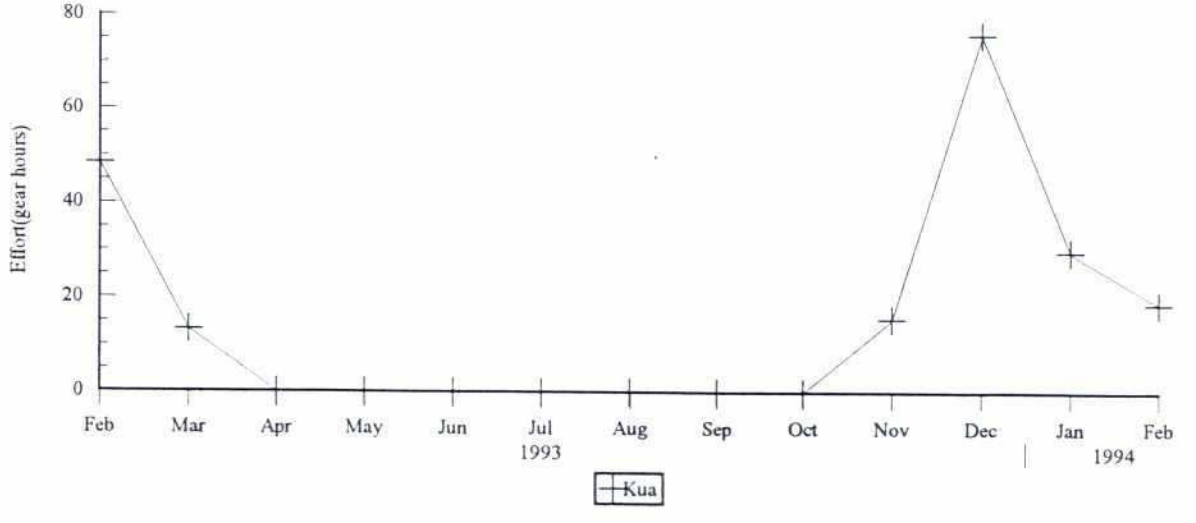
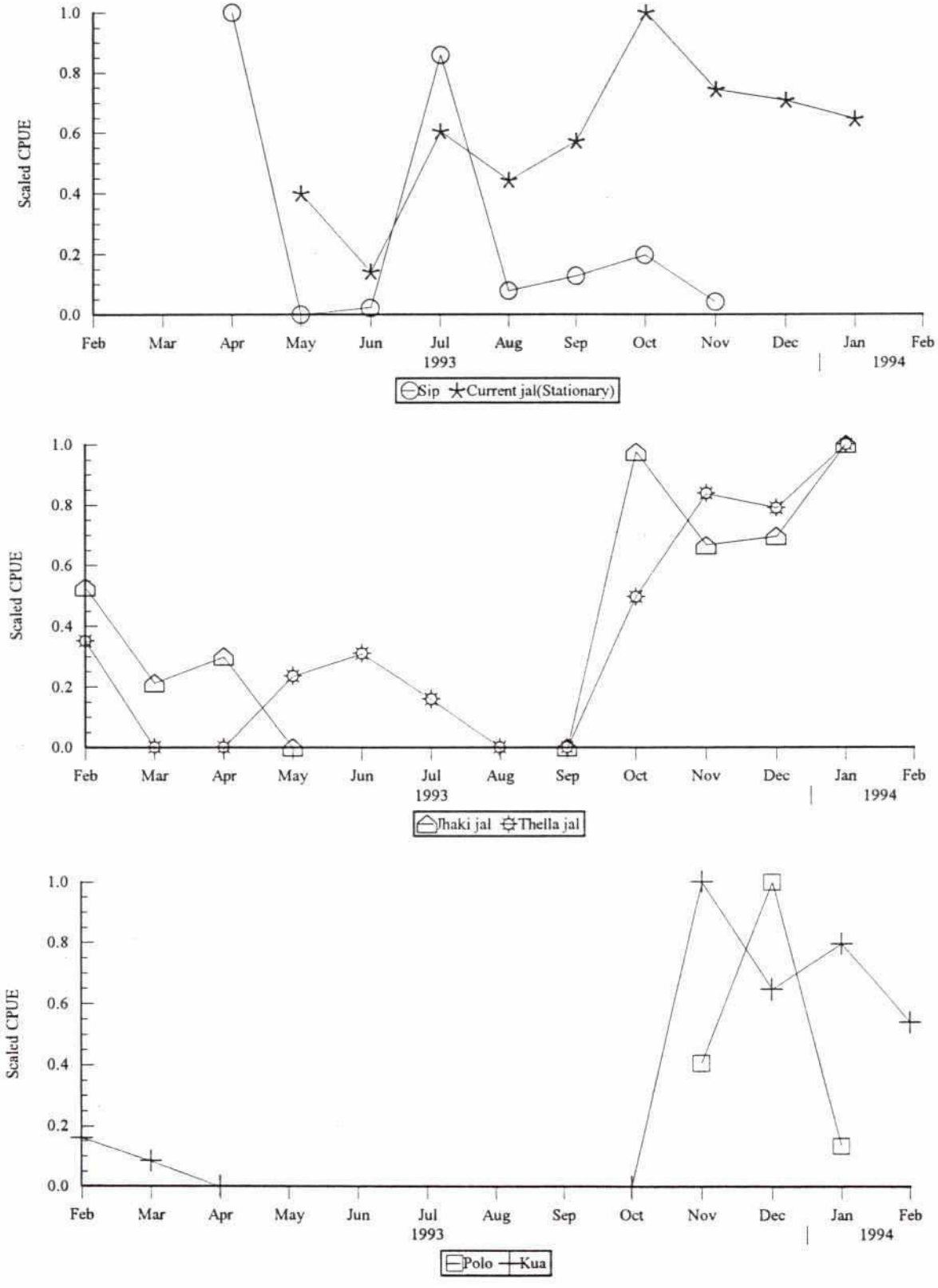
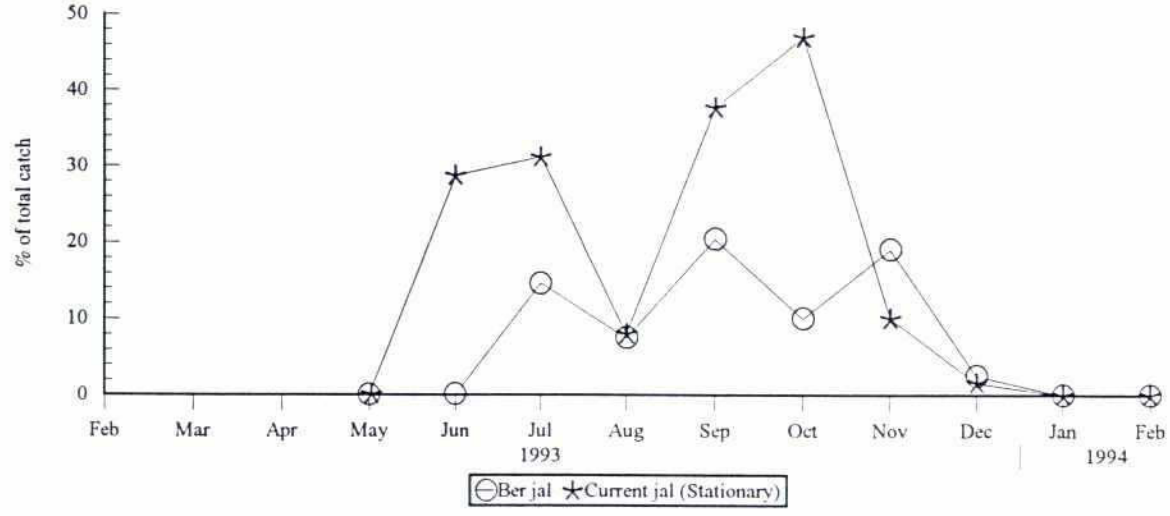


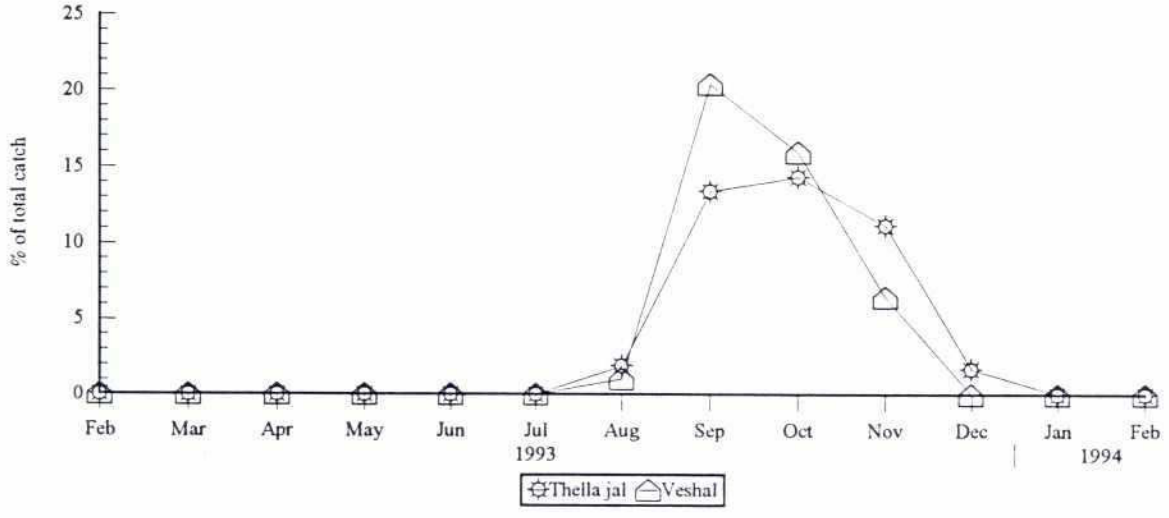
Figure 7.5 Scaled CPUE of dominant gears: floodplain sites SW09 + SW10 (outside FCD)



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded

Figure 7.6 Percentage of total monthly catch taken by dominant gears: floodplain sites SW05 + SW06 (inside FCD)





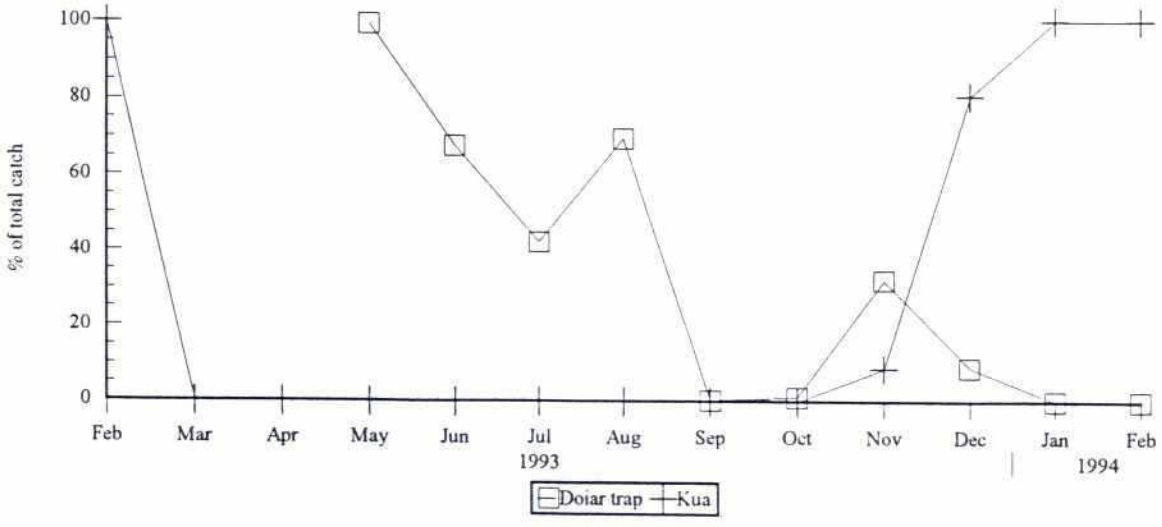


Figure 7.7 Total monthly fishing effort per hectare by dominant gears: floodplain sites SW05 + SW06 (inside FCD)

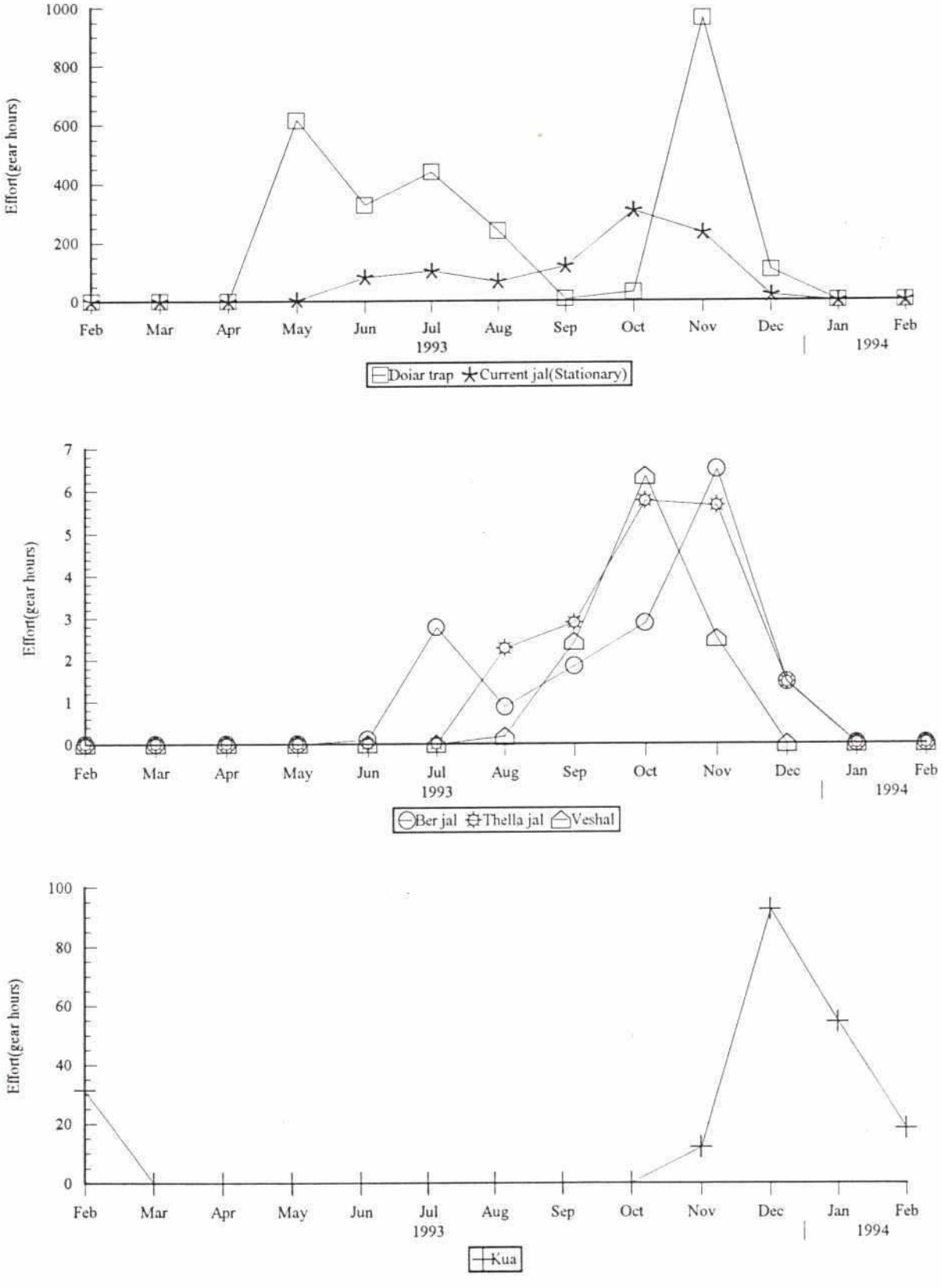
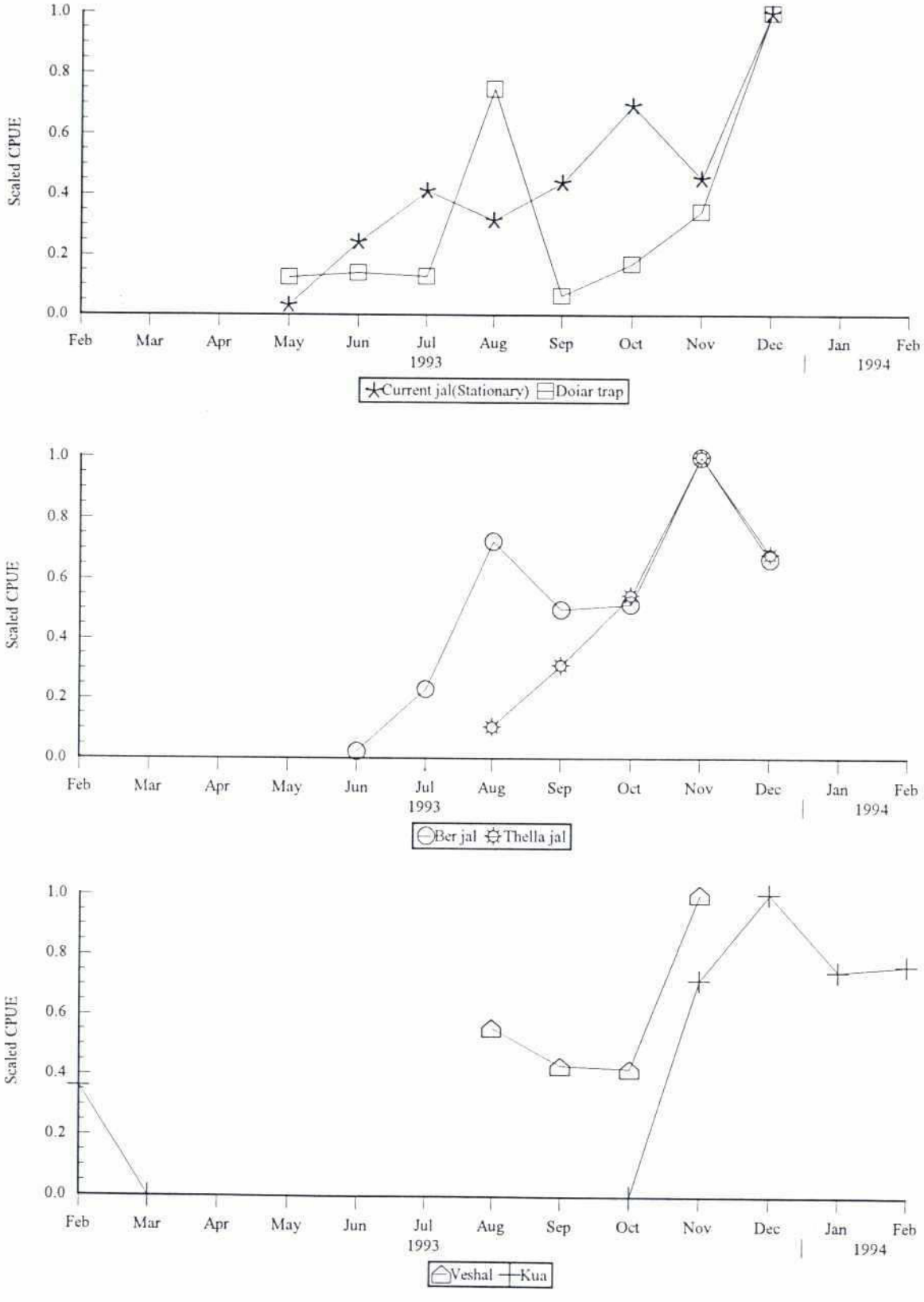


Figure 7.8 Scaled CPUE of dominant gears: floodplain sites SW05 +SW06 (inside FCD)



Note: Scaled CPUE are values of CPUE expressed as a proportion (decimal) of the maximum monthly value recorded

peaked at this time which resulted in an important contribution (20%) to the maximum monthly catch. Catches decreased considerably in January and February 1994 when *kua* provided almost all of the catch.

Inside the FCD scheme, pre-monsoon and early monsoon catches were slightly higher than those outside and were mainly provided by *doiar* traps, *current jal* and, to a lesser extent, *ber jal* (Fig. 7.6). No fishing was recorded during April when rainfall started to accumulate on the floodplain. With the onset of the drawdown in late September, *veshal* and *ber jal* gained in importance but catches still remained low. During the peak drawdown of October the pattern of fishing activities was similar to that on outside floodplains. However, during November, when catches rose dramatically, fishing patterns differed in that small *doiar* traps took most (32%) of the very high catch while *current jal* and *kua* accounted for only 10% and 8% respectively. From December onwards catches were taken mainly by *kua*. The high catch of November resulted from both increased fishing effort by dominant gears such as *doiar* and *ber jal* (Fig. 7.7) and from increased catch rates of *ber jal* and *thella jal* (Fig. 7.8). The peak catch of December resulted from fishing effort and catch rate by *kua* reaching maxima in this month.

7.3 Statistical Comparison of Catch Rates Inside and Outside the FCD Project

7.3.1 Gears excluding *katha* and *kua*

Statistical comparisons of catch rates and total catches inside and outside the FCD scheme were carried out following the methodology described in the Final Report Appendix 1. *Katha* and *kua*, which are essentially fish aggregation devices, were excluded from these analyses since no measure of fishing effort comparable with the other gears was identified.

On floodplain sites inside the FCD scheme, over 90% of the total catch per hectare for the period March 1993 to February 1994, excluding *kathas* and *kuas*, was taken by seven gears. At the outside sites, over 90% of the total catch per hectare over the same period was also taken by seven gears. In all, nine gears were used in the statistical analysis of catch rates, as listed in Table 7.6. Five gears appeared in both lists: stationary *current jal*, *thella jal*, *polo* traps, *jhaki jal* and *doiar* traps. *Current jal* took 20% of the catch per hectare at the inside sites, and 36% at the outside sites. A total of 618 individual catch rate observations were used in this analysis.

Table 7.6 Comparison of total catch (kg/ha) by dominant gears used on floodplains outside and inside the Chatla-Fukurhati Project, March 1993 - February 1994

GEAR		SEASON																	
		March - April			May - June			July - Sept			Oct - Nov			Dec - Feb					
		1			2			3			4			5			TOTAL		
		Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Pred	Pred Out	Obs	Sum Pred	Pred Out
OUTSIDE	*Current jal*	0.0	0.0		0.5	0.8		3.9	4.0		17.3	16.3		1.4	1.4		23.1	22.5	
	Thella jal	0.0	0.0		0.1	0.1		0.0	0.0		4.2	4.6		6.9	6.4		11.2	11.2	
	Polo	0.0	0.0		0.0	0.0		0.0	0.0		0.9	0.7		8.8	8.2		9.7	8.9	
	Jhaki jal	0.2	0.2		0.0	0.0		0.0	0.0		1.4	1.2		1.6	1.8		3.2	3.2	
	Doiar trap	0.0	0.0		0.1	0.1		0.8	0.5		0.2	0.3		0.4	0.3		1.5	1.2	
	Sip	0.0	0.0		0.1	0.1		3.0	3.0		0.4	0.4		0.0	0.0		3.4	3.4	
	Ucha	0.0	0.0		0.0	0.0		0.0	0.0		0.3	0.3		2.0	2.0		2.3	2.3	
TOTAL		0.3	0.3		0.8	1.0		7.7	7.6		24.7	23.7		21.2	20.3		54.6	52.8	
STD ERR			0.1			0.1			0.6			1.3			2.3			2.8	
INSIDE	*Current jal*	0.0	0.0	0.0	0.9	0.6	0.6	4.9	4.7	4.7	12.7	13.8	13.8	12.5	12.8	12.8	31.0	31.9	31.9
	Thella jal	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.1	1.1	7.5	7.1	7.1	6.0	7.6	7.6	14.6	15.7	15.7
	Polo	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.7	1.7	2.4	4.9	4.9	3.9	6.6	6.6
	Jhaki jal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	3.1	3.1	7.4	4.5	4.5	10.0	7.6	7.6
	Doiar trap	0.0	0.0	0.0	5.9	5.9	5.9	4.1	5.3	5.3	12.4	12.0	12.0	20.0	25.7	25.7	42.4	48.9	48.9
	Ber jal	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.2	3.2	10.0	10.0	10.0	8.4	8.4	8.4	21.6	21.6	21.6
	Veshal	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.4	7.8	7.8	7.8	0.0	0.0	0.0	9.2	9.2	9.2
TOTAL		0.0	0.0	0.0	6.8	6.5	6.5	14.7	15.6	15.6	54.6	55.5	55.5	56.7	63.9	63.9	132.7	141.6	141.6
STD ERR			0.0	0.0		1.6	1.6		1.4	1.4		3.8	3.8		10.3	10.3		11.2	11.2

Note: Obs = observed catches; Pred = catches predicted by statistical model; Pred out = Catches inside the scheme predicted using effort levels from outside the scheme

Comparison of the seasonally pooled catch rates by gear between inside and outside sites indicated that the main assumptions of statistical analysis were reasonably satisfied. There was generally good agreement between observed and predicated catch rates, except for *polo* and *jhaki jal* in season 5 at the inside sites, and for *doiar* in season 2 and 3 at the outside sites. In each case, these discrepancies could be traced to small numbers of catch rate observations or a single atypical catch rate observation. Repeating the statistical analysis with these observations removed resulted in almost no change in the parameter estimates or significance levels of the various tests, so the discrepancies did not bias the results.

Parameter estimates measuring the seasonal differences in underlying density of fish (as measured by catch rates) at the inside and outside sites indicated a lower density at the inside sites in season 2 and slightly higher densities at the inside sites in seasons 3, 4 and 5. No comparison was possible for season 1, when almost no fishing took place with the gears analysed. Only the comparison for season 2 was statistically significant at the 5% level when considered individually; the others were far from significant. Taken together, no significant difference was found in fish densities at inside and outside sites ($p > 0.16$).

Total annual catches per hectare by the nine gears were very much higher at the inside sites than at the outside sites (Table 7.6). However, given the lack of significant difference in fish densities between inside and outside sites detected by the statistical analysis, this is due solely to higher levels of fishing effort expended at the inside sites. Estimates of standardised effort per hectare, summed across all nine gears and seasons, were derived from the statistical analysis. For the inside site, the total standardised effort (measured in stationary *current jal* hours per hectare) was 8,148, compared with 3,618 for the outside sites. Much of the difference between sites resulted from the substantially higher fishing effort inside the FCD scheme by *doiar*, *ber jal* and *veshal*. Observed and predicated catches per hectare are shown in Table 7.6.

7.3.2 *Kua*

Because of the considerable importance of *kua* at sites both inside and outside the FCD scheme where they contributed 41% to 42% of the annual catch, separate statistical analyses of the catch of this gear were carried out. The underlying assumption on which the analyses are based is that the catch per unit area (CPUA) of *kua* is directly related to fish densities on the floodplain prior to the flood recession. A further assumption is that there is a direct positive relationship between the catch and area of *kua*. This was confirmed for those *kua*

attaining an area of 0.15 ha and 0.35 ha at outside and inside sites respectively above which the catch levelled off as area increased (Fig. 7.9). From the curvilinear relationship between catch and area, it followed that CPUA would decrease with increasing area. This negative relationship was found to be statistically significant ($P<0.05$) inside and outside the FCD scheme (Fig. 7.10). There are two possible explanations for decreases in CPUA with increasing area of *kua* above a critical size. The first relates to the brush shelter inside each *kua*. Larger *kua* may have proportionately smaller areas covered by the brush shelter, which forms the essential fish attraction device of each *kua* and therefore large *kua* might attract proportionately less fish. Alternatively, larger *kua* may have been harvested less efficiently than smaller *kua* and this again would result in proportionately less fish being captured per unit area of the larger *kua*. Data relating to second or third harvests of individual *kua* were omitted from the regression analyses shown in Figures 7.9 and 7.10 since these were generally lower than first or complete harvests and would therefore have added to the variability in the catch versus area relationship.

The mean value of CPUA recorded from sites outside the scheme was considerably higher (3440 kg/ha) than that from sites inside it (1386 kg/ha). However, *kua* inside the scheme were significantly ($P<0.01$) larger in area (mean = 0.27 ha) than those outside (mean = 0.11 ha). When the effect of area of individual *kua* was taken into account by comparing the catch of similar sized *kua*, no significant difference ($P<0.01$) was found in CPUA values (Table 7.7). The results support those relating to other dominant gears used on floodplains and indicate that there was no significant difference in floodplain fish densities inside and outside the FCD scheme. The higher total catch of *kua* inside the FCD scheme was therefore merely a function of the higher number of *kua* harvests (58 inside, 44 outside) i.e. higher fishing effort.

Table 7.7 Comparison of the catch per unit area of kua (CPUA) from sites outside and inside the Chatla-Fukurhati Project, December 1993

Variable	Outside		Inside		Parametric t-test			
	No. of *kua*	Mean CPUA (kg/m^2)	No. of *kua*	Mean CPUA (kg/m^2)	t-value	D.F.	P-value	Comment
Area	14	1317.0	11	1805.0	-1.77	23	0.093	NS
CPUA	14	0.2587	11	0.2038	1.28	23	0.212	NS

NS - not significant ($P>0.05$)

Figure 7.9 Relationship between first harvest catch (kg) and area (m²) of kua on floodplains outside and inside the Chatla-Fukurhati Project, December 1993 - February 1994

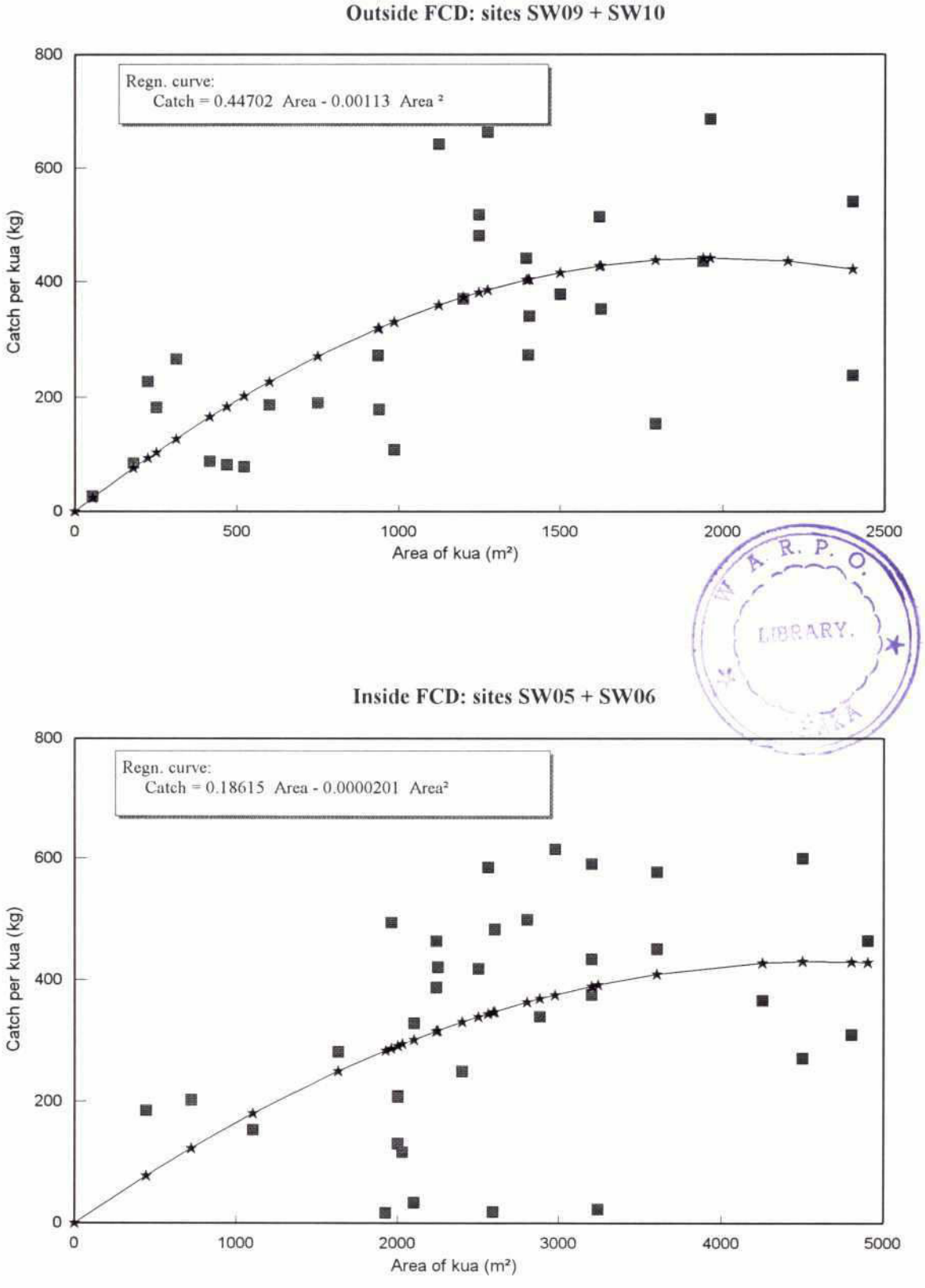
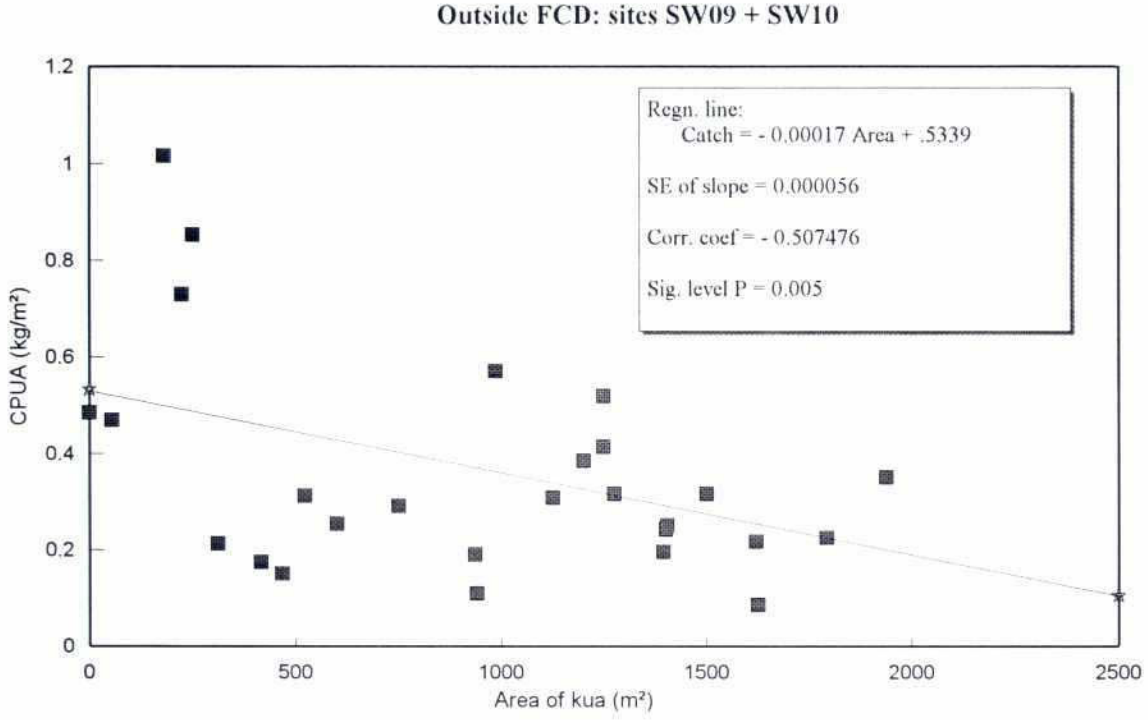
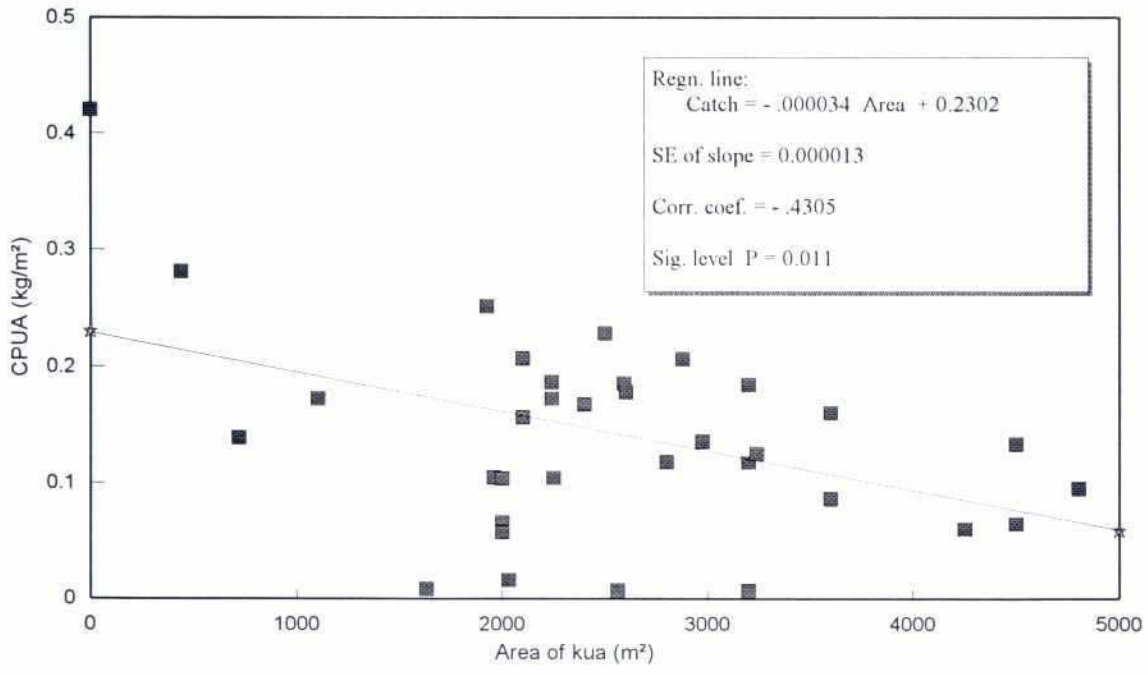


Figure 7.10 Relationship between catch per unit area (kg/m²) and area (m²) of kua on floodplains outside and inside the Chatla-Fukurhati Project, December 1993 - February 1994





7.4 Biodiversity and Catch Composition

7.4.1 Species richness

Between March 1993 and February 1994 a total of 58 species of fish was recorded from floodplains outside the FCD scheme compared with 80 species inside it. This represents a 38% higher species richness within the scheme. Possible reasons for the marked difference between sites are discussed in the next section where catch compositions and fish movements are examined at species level. Compared with species numbers recorded from sites elsewhere in the South West Region, those from the unregulated floodplains outside the Chatla-Fukurhati Project were within the same range as those from the free-flooding Bagihar *Beel* and from within Satla-Bagda Polder 1 (Table 7.8). The annual number of species recorded from sites inside the Chatla-Fukurhati Project appear unusually high (67 and 76) particularly given the numbers recorded from adjacent rivers, Arial Khan (69 species) and Bhubaneswar (62 species). In most areas studied by FAP 17, species richness was generally higher in rivers than floodplains but this does appear to be the case for the Chatla-Fukurhati Project.

Table 7.8 Comparison of the total number of fish species found on floodplains outside and inside FCD projects in the South West Region, March 1993 - February 1994

FCD Project	Sites	In/Out FCD scheme	Number of species
Chatla-Fukurhati	SW09	Out	47
	SW10	"	55
	Total	Out	58
	SW05	In	67
	SW06	"	76
	Total	In	80
Satla-Bagda Polder 1	SW13	Out	40
	SW14	"	50
	SW15	"	52
	SW16	"	51
	Total	Out	63
	SW18	In	40
	SW19	"	42
	SW21	"	45
	SW22	"	55
	Total	In	60

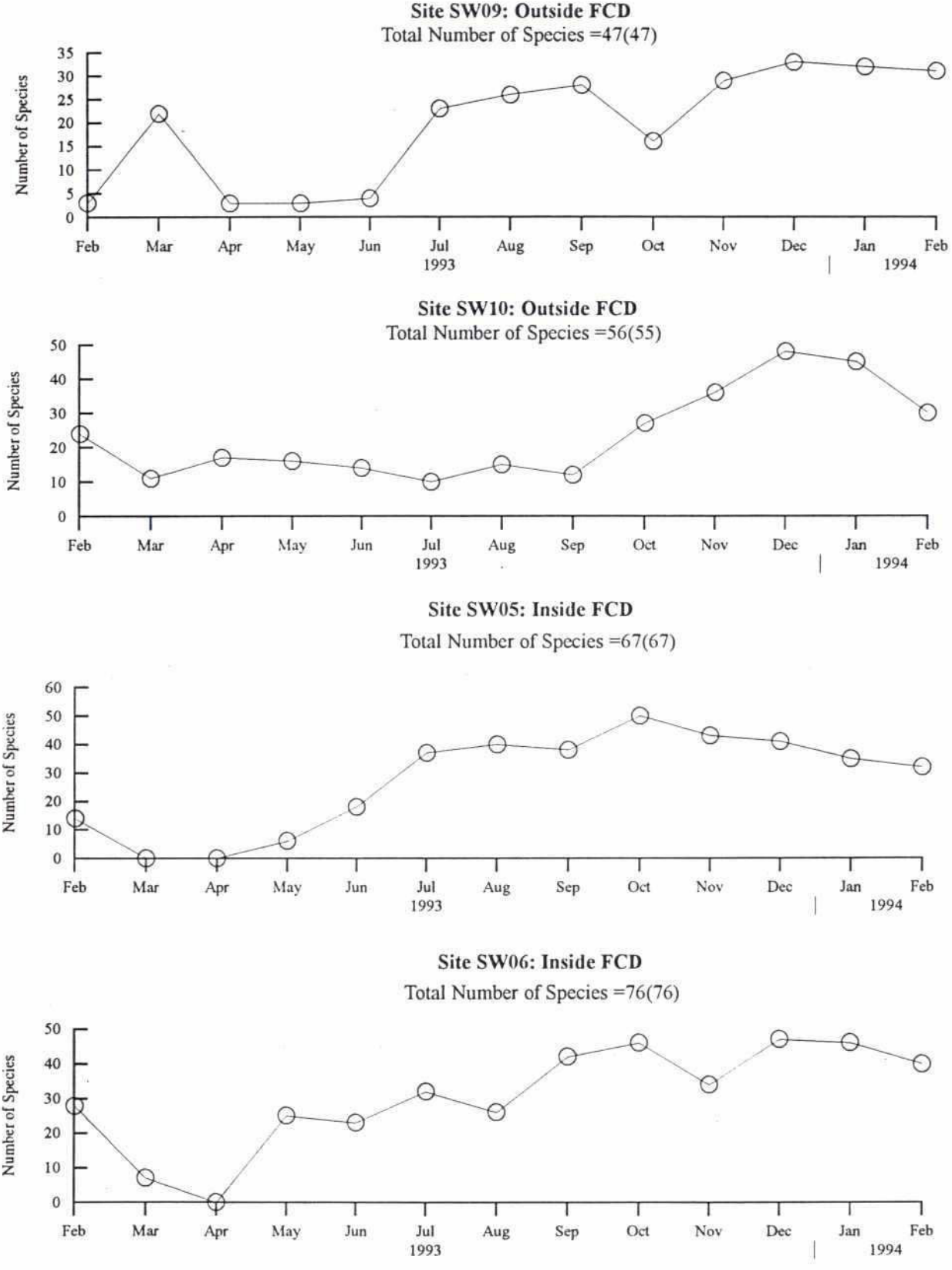
Seasonal variations in species richness were not closely related to catch trends (Figs. 7.11 and 7.12). They also differed somewhat between inside and outside the scheme for those sites on the lower-lying land (SW06 and SW10) but showed reasonable similarity on slightly higher elevations (SW05 and SW09). Outside the FCD, at SW09, species number increased sharply between June and July coinciding with the first river flooding. From July to December there was a small but progressive increase in species number with a temporary drop in October. In January and February 1994 a slight decrease in species richness was recorded. A similar pattern was seen on the comparable inside site (SW05) except that here, species number peaked in October followed by a small but progressive decline until February. At the lower-lying site inside the FCD scheme (SW06), species number showed little change between May and August, a moderate increase until December followed by a slight decrease in the following two months. At the comparable site outside, species number remained low and steady from March until September, followed by a strong progressive increase peaking in December and declining fairly sharply in February. One notable feature of trends inside and outside the FCD scheme, is the retention of high species diversity by *kua* during the winter months (December - February). This feature was also observed on floodplains of Satla-Bagda Polder 1 and Bagihar *Beel* and it is one which enhances the potential conservation and management value of *kua* as possible small-scale sanctuaries for wild fish stocks.

7.4.2 Catch composition

The percentage contribution made by dominant species to the total annual catches from combined site areas inside and outside the FCD scheme are shown in Table 7.9. More detailed monthly catch compositions from the same areas are presented in Tables 7.10 and 7.11. In all tables species have been divided into three categories of habitat preference: riverine, migratory and floodplain resident (see section 5.1.2 for definitions). The percentage contributions made by each of these categories inside and outside the FCD are summarised in Table 7.12.

Floodplain resident species dominated the annual catch from sites outside the FCD to a much greater degree than inside it (94% vs 70%). Only 12 migratory species were recorded outside comprising about 3% of the catch compared with 21 species inside the FCD accounting for 13% of the catch. Only one riverine species was found outside making up less than 0.1% of the catch while 16 species occurred inside the scheme but these were all quite rare and together again made up less than 0.1% of the annual catch.

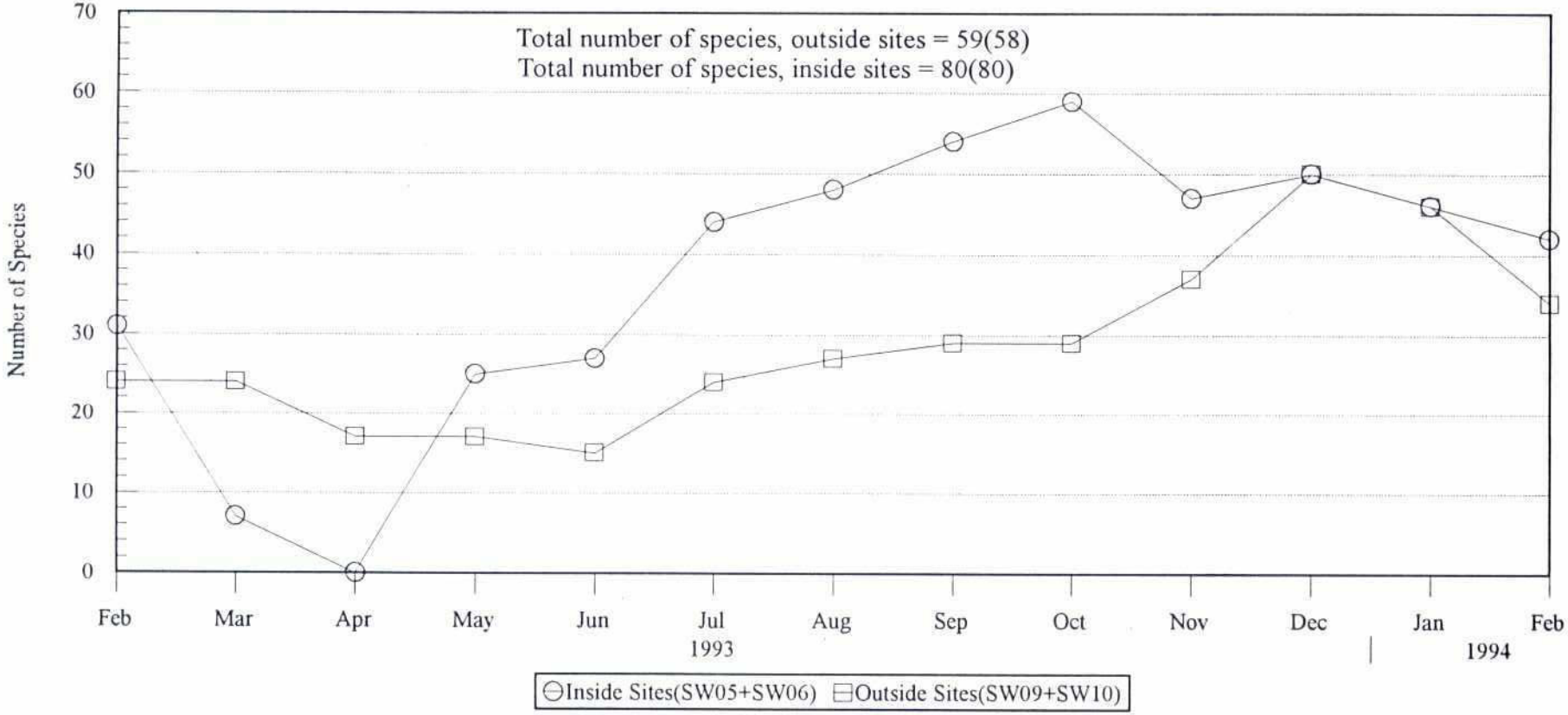
Figure 7.11 Seasonal variation in the number of fish species recorded from individual floodplain sites outside and inside the Chatla -Fukurhati Project, February 1993 - February 1994



Notes: 1. Annual total number of species recorded between March 1993 and February 1994 given in parentheses

2. No fishing activities were observed at SW05 in March and April 1993 and at SW06 in April 1993

Figure 7.12 Seasonal variation in the number of fish species recorded from combined floodplain sites outside and inside the Chatla-Fukurhati Project, February 1993 - February 1994



Notes: 1. Annual total number of species recorded between March 1993 and February 1994 given in parentheses

2. No fishing activities were observed at inside sites in April 1993

Table 7.9 Percentage contribution(by weight) to the total annual catch by dominant species from floodplains outside and inside the Chatla–Fukurhati Project, March 1993 – February 1994

Habitat	Species name		Chatla–Fukurhati	
Preference	Scientific	Bengali	Outside	Inside
Migratory	*Aorichthys aor*	*Ayre*	–	1.7
	Catla catla	*Catla*	–	2.9
	Labeo calbasu	*Kalbaus*	–	1.0
	Labeo rohita	*Rui*	–	3.7
	Wallagu attu	*Boal*	1.3	–
Subtotal			1.3	9.4
Floodplain	*Anabas testudineus*	*Koi*	9.9	3.1
Resident	*Mystus vittatus*	*Tengra*	1.9	2.2
	Colisa fasciatus	*Khalisha*	6.6	1.3
	Colisa lalia	*Lal khalisha*	2.1	–
	Colisa sota	*Khalisha*	1.4	–
	Xenentodon cancila	*Kaikka*	1.0	1.6
	Osteobrama cotio cotio	*Keti*	–	1.1
	Puntius conchonius	*Canchan puti*	2.4	2.6
	Puntius sophore	*Puti*	15.6	12.1
	Puntius ticto	*Tit puti*	–	1.1
	Glossogobius giurus	*Bailla*	–	1.6
	Lepidocephalus guntea	*Gutum*	1.4	1.7
	Channa marulius	*Gajar*	2.1	2.6
	Channa punctatus	*Taki*	16.4	12.0
	Channa striatus	*Shol*	13.3	4.8
	Heteropneustes fossilis	*Shingi*	5.8	3.2
	Macrognathus aculeatus	*Tara baim*	–	2.0
	Macrognathus pancalus	*Guchi*	1.4	3.2
	Mastacembelus armatus	*Baral baim*	–	3.1
	Nandus nandus	*Bheda*	4.6	–
	Notopterus notopterus	*Foli*	–	4.0
	Tetraodon cutcutia	*Potka*	1.7	1.2
Subtotal			87.5	64.4
Other	Prawn spp.	*Chingri/Icha*	3.8	15.9
Grand total			92.6	89.7

Notes: 1. Dominant species are defined as those species which comprised 1% or more of the total annual catch

2. Shaded values highlight the most abundant species(>4%)

3. See text for definitions of habitat preference categories (Section 5.1.2)

Table 7.10 Monthly catch composition from floodplains (% by weight):outside FCD (sites SW09+SW10)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
10	Riverine	*Apocryptes bato*	*Chiring*	–	–	–	–	–	–	–	–	–	–	–	0.125	–	4.684	0.014
	Subtotal			–	–	–	–	–	–	–	–	–	–	–	0.1252	–	4.684	0.0144
130	Migratory	*Aorichthys aor*	*Ayre*	–	–	–	–	–	0.023	–	0.266	–	–	0.275	0.154	–	44.862	0.138
24		*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	–	–	0.002	–	–	0.244	0.001
131		*Mystus bleekeri*	*Golsha tengra*	–	–	–	–	–	–	–	–	–	0.022	0.050	0.113	–	12.536	0.039
32		*Catla catla*	*Catla*	–	–	–	–	–	–	–	0.792	–	0.013	0.226	0.166	–	43.994	0.135
48		*Cirrhinus reba*	*Raik*	–	–	–	–	–	–	–	0.382	–	–	0.049	–	–	9.727	0.030
102		*Labeo calbasu*	*Kalbaus*	–	–	–	–	–	–	–	–	–	–	0.008	–	–	1.011	0.003
107		*Labeo rohita*	*Rui*	–	–	–	–	–	–	–	1.344	1.213	0.067	1.124	2.470	–	285.297	0.878
188		*Salmostoma bacaila*	*Katari*	–	0.737	–	–	–	–	–	–	–	–	–	–	–	1.377	0.004
189		*Salmostoma phulo*	*Fulchela*	–	–	–	–	–	–	–	–	–	–	–	0.022	–	0.808	0.002
169		*Pseudeutropius atherinoides*	*Batasi*	–	1.378	–	–	–	–	0.018	–	–	–	–	–	–	2.822	0.009
209		*Wallagu attu*	*Boal*	1.550	11.130	–	–	–	–	0.342	–	–	0.190	1.891	3.403	0.089	419.886	1.292
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	–	–	–	–	–	0.207	–	7.750	0.024
	Subtotal			1.5504	13.244	–	–	–	0.0233	0.3595	2.7828	1.213	0.2912	3.6242	6.5334	0.0893	830.314	2.5544
6	Floodplain	*Anabas testudineus*	*Koi*	6.921	4.357	19.093	0.825	22.822	29.230	15.894	47.221	22.802	9.138	4.336	4.328	11.753	3203.203	9.855
136	Resident	*Mystus tengara*	*Bajari tengra*	–	1.185	–	–	–	–	–	0.059	0.060	0.005	0.037	0.194	0.056	17.416	0.054
137		*Mystus vittatus*	*Tengra*	8.025	17.599	14.749	–	4.259	0.061	3.667	0.508	0.346	1.717	1.901	2.564	0.784	602.820	1.855
55		*Colisa fasciatus*	*Khalisha*	6.449	5.660	4.128	0.607	8.374	2.477	0.371	5.297	12.287	9.213	6.299	3.784	4.548	2143.651	6.595
211		*Colisa labiosus*	*Khalisha*	0.270	–	–	16.811	–	1.053	0.431	–	0.501	0.009	0.194	0.173	0.132	75.610	0.233
56		*Colisa lalia*	*Lal khalisha*	–	–	–	–	0.095	6.092	0.014	–	–	0.318	4.247	0.432	0.176	690.009	2.123
57		*Colisa sota*	*Khalisha*	0.345	0.513	–	14.675	–	1.720	–	–	–	2.835	1.503	0.207	–	460.605	1.417
210		*Xenentodon cancila*	*Kaikka*	1.881	6.856	–	–	0.036	–	3.330	1.128	0.712	1.884	0.426	0.469	1.757	330.932	1.018
62		*Cyprinus carpio*	*Karfu*	–	–	–	–	–	–	–	–	–	–	–	0.114	–	4.250	0.013
65		*Cyprinus specularis*	*Mirror carp*	–	–	–	–	–	–	–	–	–	–	–	0.047	–	1.753	0.005
187		*Osteobrama cotio cotio*	*Keti*	–	–	–	–	–	–	–	–	–	–	0.011	0.007	0.347	6.577	0.020
175		*Puntius conchonius*	*Canchan puti*	–	0.993	–	2.458	–	0.490	1.788	0.129	0.514	2.129	2.598	4.724	2.041	763.523	2.349
176		*Puntius gelius*	*Giliputi*	0.019	–	–	11.603	–	0.105	–	–	1.604	0.074	0.408	0.040	–	104.909	0.323
179		*Puntius sarana*	*Sarputi*	–	–	–	–	–	–	–	–	–	–	0.003	–	–	0.354	0.001
180		*Puntius sophore*	*Puti*	17.709	4.581	14.654	13.296	13.734	21.242	20.981	13.908	15.923	19.917	12.253	17.074	9.532	5053.311	15.546
212		*Puntius ticto*	*Tit puti*	0.221	1.549	–	1.848	0.525	0.055	0.306	–	0.848	0.379	1.044	0.487	0.290	219.091	0.674
5		*Amblypharyngodon mola*	*Mola*	–	–	–	–	–	0.423	1.254	0.777	–	0.059	0.017	0.007	0.271	41.042	0.126
68		*Danio devario*	*Chebli*	0.093	–	–	–	–	–	–	–	–	–	–	–	–	–	–
75		*Esomus danricus*	*Darkina*	0.073	1.409	–	–	–	0.679	–	–	–	–	0.484	0.129	0.126	82.689	0.254
182		*Rasbora daniconius*	*Darkina*	0.114	–	–	14.414	–	1.094	0.558	–	0.258	0.125	0.236	0.375	1.604	114.073	0.351
83		*Glossogobius giurus*	*Bailla*	–	2.115	–	0.618	0.286	–	0.979	0.122	0.042	0.154	0.195	0.420	0.060	74.896	0.230
11		*Aristichthys nobilis*	*Bighead carp*	–	–	–	–	–	–	–	–	–	–	–	1.050	–	39.280	0.121
91		*Hypophthalmichthys molitrix*	*Silver carp*	–	–	–	–	–	–	–	–	–	0.018	0.146	–	–	20.814	0.064
43		*Chela cachius*	*Chep chela*	–	–	–	–	–	–	–	–	0.039	–	–	–	–	0.871	0.003
110		*Lepidocephalus guntea*	*Gutum*	1.216	4.357	2.373	3.694	–	–	0.765	0.645	0.220	0.276	2.554	1.464	0.843	459.288	1.413
9		*Aplocheilus panchax*	*Kanpona*	–	–	–	7.382	–	0.136	–	–	–	–	0.011	–	–	7.424	0.023

Note: – denotes zero catch

(Cont.)

Table 7.10 Monthly catch composition from floodplains (% by weight):outside FCD (sites SW09+SW10)

Species	Habitat	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
Code	Preference	Scientific	Bengali	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
39		*Channa marulius*	*Gajar*	1.226	–	–	–	–	–	2.093	0.068	0.100	1.077	2.916	4.371	0.351	671.557	2.066
40		*Channa orientalis*	*Cheng*	–	–	–	–	–	–	0.202	–	–	0.018	0.028	0.258	–	17.600	0.054
41		*Channa punctatus*	*Taki*	33.480	4.614	13.662	7.443	22.908	4.325	28.425	7.953	12.123	22.198	11.604	21.445	28.665	5327.101	16.389
42		*Channa striatus*	*Shol*	1.286	3.767	–	–	–	–	–	0.802	3.476	3.696	27.170	6.788	5.888	4320.405	13.292
49		*Clarias batrachus*	*Magur*	0.371	2.275	–	–	–	–	–	–	0.262	0.224	0.321	1.435	3.727	175.974	0.541
50		*Clarias gariepinus*	*African magur*	–	–	–	–	–	–	–	–	–	–	0.014	–	–	1.876	0.006
150		*Oreochromis mossambica*	*Tilapia*	–	–	–	–	–	–	–	–	–	–	0.045	–	–	5.938	0.018
88		*Heteropneustes fossilis*	*Shingi*	3.223	12.901	20.091	0.733	19.699	12.316	6.560	0.450	6.354	6.504	3.634	6.604	12.795	1885.298	5.800
121		*Macrognathus aculeatus*	*Tara baim*	–	0.545	0.721	–	1.758	2.382	0.556	1.019	0.869	1.242	0.492	1.339	1.647	307.774	0.947
123		*Macrognathus pancalus*	*Guchi*	2.163	3.279	5.677	0.618	–	3.327	1.298	3.664	0.988	1.171	1.129	1.325	3.366	463.301	1.425
122		*Mastacembelus armatus*	*Baral baim*	–	–	4.645	–	–	–	0.708	1.133	0.679	0.537	0.203	1.822	3.528	222.875	0.686
138		*Nandus nandus*	*Bheda*	–	0.416	–	–	–	0.799	8.927	10.856	10.303	4.388	3.553	5.226	1.365	1488.278	4.579
15		*Badis badis*	*Napit koi*	0.062	–	–	1.131	0.066	0.113	–	–	0.021	–	0.005	0.058	–	5.586	0.017
148		*Ompok pabda*	*Madhu pabda*	0.537	5.447	–	–	0.024	0.536	0.198	0.311	0.068	0.267	0.371	0.259	0.197	106.924	0.329
145		*Notopterus notopterus*	*Foli*	–	–	–	–	–	–	–	0.130	–	0.204	0.851	0.998	0.709	177.274	0.545
203		*Tetraodon cutcutia*	*Potka*	0.261	0.160	–	–	–	–	0.006	–	0.026	2.542	2.360	0.706	0.980	552.269	1.699
33		*Chaca chaca*	*Cheka*	–	–	–	–	–	–	–	–	–	–	0.064	–	–	8.440	0.026
35		*Chanda baculis*	*Chanda*	–	–	–	–	–	–	–	–	–	0.028	0.078	0.123	–	17.088	0.053
36		*Chanda nama*	*Nama chanda*	–	–	–	–	0.012	0.727	0.070	0.055	0.175	0.204	0.033	0.282	0.346	50.942	0.157
37		*Chanda ranga*	*Lal chanda*	0.106	–	–	1.230	0.191	0.808	0.057	0.215	1.209	0.448	0.036	0.383	0.566	103.544	0.319
	Subtotal			86.050	84.576	99.793	99.383	178.78	90.187	99.437	96.450	92.808	92.999	93.808	91.510	98.449	30428.4	93.612
998	Others	Unidentified fish		–	–	–	–	–	–	–	–	–	–	0.027	–	–	3.617	0.011
931		Prawn spp.	*Chingri/Icha*	12.398	2.179	0.207	0.618	5.213	9.789	0.202	0.639	5.977	6.709	2.539	1.830	1.460	1236.493	3.804
945		*Carb sp*	*Kakra*	–	–	–	–	–	–	–	0.127	–	–	–	–	–	1.095	0.003
	Subtotal			12.398	2.1789	0.2068	0.6176	5.2132	9.7887	0.2024	0.766	5.9767	6.7087	2.5662	1.8297	1.4602	1241.20	3.8185
	Grand total			100	100	100	100	184	100	100	100	100	100	100	100	100	32504.638	100

Note: – denotes zero catch

Table 7.11 Monthly catch composition from floodplains (% by weight):inside FCD (sites SW05+SW06)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
21	Riverine	*Barilius shacra*	*Koksa*	–	–	–	–	–	–	–	–	–	0.005	–	–	0.643	0.002
59		*Crossocheilus latius*	*Kalabata*	–	–	–	–	–	0.027	–	–	–	–	–	–	0.771	0.002
139		*Nemacheilus botia*	*Balichata*	–	–	–	–	–	–	–	–	0.009	0.067	–	–	9.826	0.023
28		*Botia dario*	*Rani*	–	–	–	–	0.002	0.005	–	0.017	–	–	–	–	0.984	0.002
58		*Corica soborna*	*Kachki*	–	–	–	–	–	–	0.013	0.012	–	–	–	–	0.805	0.002
193		*Setipinna phasa*	*Phasa*	–	–	–	–	–	–	2.463	0.237	–	–	–	–	48.479	0.113
31		*Scartelaos histophorus*	*Dahuk*	–	–	–	–	0.138	–	–	–	–	–	–	–	2.016	0.005
125		*Moringua raitaborua*	*Rata boura*	–	–	–	–	0.991	–	–	–	–	–	–	–	14.521	0.034
126		*Liza subviridis*	*Bata*	–	–	–	–	–	–	–	–	–	0.034	–	–	4.360	0.010
2		*Ailia coila*	*Kajuli*	–	–	–	–	–	0.007	5.200	0.556	–	–	–	–	105.312	0.246
51		*Clupisoma garua*	*Ghaura*	–	–	–	–	0.072	0.023	3.505	0.509	–	–	–	–	79.121	0.185
196		*Silonia silondia*	*Shillong*	–	–	–	–	–	–	0.104	0.110	–	–	–	–	6.976	0.016
81		*Gagata youssoufi*	*Gang tengra*	–	–	–	–	–	–	0.087	0.069	–	–	–	–	4.712	0.011
87		*Hara hara*	*Kutakanti*	–	–	–	–	–	–	0.070	–	–	–	–	–	1.045	0.002
157		*Pampus chinensis*	*Rup chanda*	–	–	–	–	–	–	0.125	–	–	–	–	–	1.873	0.004
45		*Chelonodon fluviatilis*	*Potka*	–	–	–	–	–	–	–	–	–	–	0.004	–	0.191	0.0004
	Subtotal			–	–	–	–	1.202	0.062	11.567	1.510	0.009	0.106	0.004	–	281.635	0.658
130	Migratory	*Acrichthys aor*	*Ayre*	1.611	–	–	–	0.078	–	4.005	6.393	0.383	1.432	2.170	2.158	737.838	1.723
135		*Acrichthys seenghala*	*Guizza*	–	–	–	–	–	0.087	–	0.076	–	–	–	–	6.182	0.014
24		*Batasio batasio*	*Tengra*	–	–	–	–	–	–	–	–	–	0.002	0.012	–	0.797	0.002
131		*Mystus bleekeri*	*Golsha tengra*	–	1.405	–	1.750	0.013	–	0.075	0.451	0.065	0.005	0.336	0.533	68.811	0.161
132		*Mystus cavasius*	*Kabashi*	2.765	–	–	4.644	0.045	0.033	0.415	1.109	–	0.007	–	–	97.699	0.228
32		*Catla catla*	*Catla*	1.602	–	–	–	0.633	0.052	–	5.030	0.021	1.965	11.449	12.872	1243.124	2.904
47		*Cirrhinus mrigala*	*Mrigel*	–	–	–	–	–	–	0.442	0.251	–	0.204	2.598	4.509	235.572	0.550
48		*Cirrhinus reba*	*Raik*	3.758	–	–	–	–	0.013	2.647	6.057	0.346	0.035	0.041	0.031	383.095	0.895
100		*Labeo bata*	*Bata*	–	–	–	–	–	–	–	1.437	–	–	0.031	0.143	74.184	0.173
101		*Labeo boga*	*Bhangan*	–	–	–	–	–	–	–	–	–	–	–	0.003	0.048	0.0001
102		*Labeo calbasu*	*Kalbaus*	0.752	1.570	–	–	–	0.052	0.446	4.448	0.109	0.264	2.060	4.453	438.125	1.023
104		*Labeo gonius*	*Goni*	–	–	–	–	–	0.002	0.028	0.048	–	–	–	–	2.852	0.007
107		*Labeo rohita*	*Rui*	5.229	–	–	–	–	0.083	0.390	4.594	0.508	5.367	9.035	11.690	1587.806	3.709
188		*Salmostoma bacaila*	*Katari*	–	–	0.642	–	0.063	–	0.088	0.308	0.002	–	–	–	23.048	0.054
189		*Salmostoma phulo*	*Fulchela*	–	–	–	0.556	1.080	0.007	0.776	0.183	0.156	–	0.001	–	58.507	0.137
86		*Gudusia chapra*	*Chapila*	–	–	–	0.676	–	0.002	0.634	0.789	–	–	–	–	53.279	0.124
54		*Coilia ramcarati*	*Olua*	–	–	–	–	–	–	0.243	–	–	–	–	–	3.633	0.008
76		*Eutropiichthys vacha*	*Bacha*	–	–	–	–	0.046	0.083	1.639	0.234	–	–	–	–	39.037	0.091
169		*Pseudeutropius atherinoides*	*Batasi*	0.456	–	–	0.044	0.169	–	0.010	0.016	–	–	–	–	3.755	0.009
209		*Wallagu attu*	*Boal*	1.138	–	–	–	–	0.419	–	–	–	0.814	3.123	2.188	295.320	0.690
144		*Notopterus chitala*	*Chital*	–	–	–	–	–	–	0.163	1.141	0.064	0.386	1.083	3.046	213.589	0.499
	Subtotal			17.310	2.976	0.642	7.670	2.127	0.834	12.001	32.564	1.655	10.481	31.938	41.624	5566.301	13.002
6	Floodplain	*Anabas testudineus*	*Koi*	8.717	–	6.236	1.545	6.615	1.019	0.923	2.347	1.147	4.187	5.505	4.099	1310.917	3.062
136	Resident	*Mystus tengara*	*Bajari tengra*	–	–	1.684	–	0.666	0.230	0.330	0.427	0.287	0.282	0.254	0.220	140.789	0.329
137		*Mystus vittatus*	*Tengra*	1.933	–	4.150	2.484	2.857	2.381	2.165	4.048	1.824	1.308	2.919	1.535	928.423	2.169
55		*Colisa fasciatus*	*Khalisha*	1.410	–	1.353	4.925	0.287	0.116	0.373	2.167	1.337	1.267	1.559	0.516	563.226	1.316
211		*Colisa labiosus*	*Khalisha*	–	–	4.330	–	2.827	1.549	–	0.650	0.725	0.059	0.001	–	243.837	0.570

Note: – denotes zero catch

(Cont.)

Table 7.11 Monthly catch composition from floodplains (% by weight):inside FCD (sites SW05+SW06)

Species Code	Habitat Preference	Species name		Year: 1993										Year: 1994		Total annual catch (Mar'93 – Feb'94)	
		Scientific	Bengali	Feb	Mar	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Kg	%
56		*Colisa lalia*	*Lal khalisha*	0.483	–	10.344	1.386	0.748	1.754	0.028	0.009	1.224	0.026	0.022	0.015	303.183	0.708
57		*Colisa sota*	*Khalisha*	–	–	4.992	3.731	0.839	–	0.242	0.003	0.265	0.002	–	–	116.657	0.272
210		*Xenentodon cancila*	*Kaikka*	0.725	–	0.180	–	2.384	0.396	1.765	2.223	2.649	0.843	1.465	0.827	672.590	1.571
187		*Osteobrama cotio cotio*	*Keti*	–	–	0.040	1.559	0.181	0.074	0.821	2.997	2.083	0.241	0.077	0.213	449.827	1.051
175		*Puntius conchonius*	*Canchan puti*	–	–	–	1.803	2.696	0.364	0.124	0.958	1.825	5.102	1.314	3.768	1102.183	2.574
176		*Puntius gelius*	*Giliputi*	–	–	–	–	0.231	1.402	0.137	0.175	0.044	–	–	–	58.594	0.137
179		*Puntius sarana*	*Sarputi*	–	–	–	–	–	–	0.173	–	–	–	–	–	2.595	0.006
180		*Puntius sophore*	*Puti*	1.649	–	14.185	7.806	16.676	5.729	23.173	6.900	14.255	15.432	3.096	10.078	5192.491	12.129
181		*Puntius terio*	*Teri punti*	–	–	–	–	0.036	–	–	–	–	0.006	–	–	1.274	0.003
212		*Puntius ticto*	*Tit puti*	0.151	–	12.021	3.633	3.578	0.635	1.706	0.673	1.316	0.392	0.082	0.274	466.614	1.090
5		*Amblypharyngodon mola*	*Mola*	–	–	1.303	2.276	1.115	1.900	0.913	0.085	0.006	0.221	0.086	0.181	152.187	0.355
68		*Danio devario*	*Chebli*	–	–	–	–	–	–	–	–	0.004	–	–	–	0.474	0.001
75		*Esomus danricus*	*Darkina*	1.020	–	5.593	–	–	0.589	0.065	–	0.015	0.041	0.037	0.077	75.474	0.176
182		*Rasbora daniconius*	*Darkina*	0.403	–	2.207	–	0.169	0.009	–	0.079	0.080	0.082	0.020	0.127	48.096	0.112
83		*Glossogobius giurus*	*Bailla*	–	10.586	1.123	7.135	4.306	3.389	3.647	1.390	2.197	0.552	0.543	0.477	700.917	1.637
91		*Hypophthalmichthys molitrix*	*Silver carp*	–	–	–	–	–	–	0.220	–	–	–	–	–	3.290	0.008
43		*Chela cachius*	*Chep chela*	–	–	–	–	–	–	–	0.042	–	–	–	–	2.037	0.005
110		*Lepidocephalus guntea*	*Gutum*	0.591	–	0.905	0.490	6.644	2.756	0.407	0.243	4.020	0.487	0.377	0.218	743.281	1.736
9		*Aplocheilus panchax*	*Kanpona*	–	–	2.105	–	–	–	–	0.002	0.039	–	–	–	22.486	0.053
39		*Channa marulius*	*Gajar*	1.774	46.319	–	–	1.287	0.430	0.395	0.456	0.478	5.742	4.243	2.326	1108.458	2.589
40		*Channa orientalis*	*Cheng*	–	–	–	–	–	0.009	–	0.025	–	–	–	–	1.471	0.003
41		*Channa punctatus*	*Taki*	10.465	4.881	7.687	7.504	10.023	4.434	2.046	3.232	18.175	13.409	11.719	12.338	5116.726	11.952
42		*Channa striatus*	*Shol*	6.030	–	–	–	0.497	0.320	0.150	0.568	3.136	9.880	6.398	4.965	2058.474	4.808
49		*Clarias batrachus*	*Magur*	12.413	–	–	–	0.055	–	–	–	0.261	0.164	0.068	0.123	56.727	0.133
88		*Heteropneustes fossilis*	*Shingi*	0.115	34.078	0.677	7.529	2.369	0.757	1.183	2.901	2.423	3.467	5.901	4.494	1356.648	3.169
121		*Macrognathus aculeatus*	*Tara baim*	0.349	–	0.742	2.778	3.688	8.859	2.423	4.084	1.120	0.869	1.287	0.479	874.422	2.042
123		*Macrognathus pancalus*	*Guchi*	1.342	0.662	4.158	1.884	6.182	4.179	1.013	2.208	5.028	1.953	3.019	1.078	1360.045	3.177
122		*Mastacembelus armatus*	*Baral baim*	–	–	–	0.519	10.829	0.174	1.435	3.249	0.625	4.571	6.298	0.619	1312.155	3.065
138		*Nandus nandus*	*Bheda*	–	–	–	–	–	0.013	–	0.529	0.480	1.590	1.196	0.657	352.728	0.824
15		*Badis badis*	*Napit koi*	–	–	0.962	0.033	0.479	0.708	–	0.067	0.017	0.004	–	–	41.323	0.097
147		*Ompok bimaculatus*	*Kani pabda*	–	–	–	–	–	–	–	–	–	0.165	–	–	21.467	0.050
148		*Ompok pabda*	*Madhu pabda*	2.064	–	–	0.725	0.121	0.016	0.275	0.911	0.166	0.284	1.959	1.169	220.377	0.515
145		*Notopterus notopterus*	*Foli*	29.739	–	–	–	–	0.335	0.770	3.797	1.604	7.302	6.670	4.720	1719.127	4.016
203		*Tetraodon cutcutia*	*Potka*	–	–	–	2.112	0.269	2.502	0.512	1.225	1.580	1.176	0.768	0.350	530.441	1.239
33		*Chaca chaca*	*Cheka*	–	–	–	–	–	–	–	–	–	0.010	0.364	0.166	20.554	0.048
35		*Chanda baculis*	*Chanda*	–	–	–	–	0.273	0.010	0.052	0.007	0.487	–	0.018	0.004	61.416	0.143
36		*Chanda nama*	*Nama chanda*	–	–	1.524	1.730	1.080	0.998	2.384	0.778	0.477	0.281	0.084	0.237	241.968	0.565
37		*Chanda ranga*	*Lal chanda*	0.134	–	2.466	3.593	3.237	2.401	1.200	1.085	0.884	0.314	0.202	0.408	390.730	0.913
	Subtotal			81.504	96.526	176.966	67.179	93.242	50.438	51.049	50.539	72.285	81.709	67.547	56.755	30146.699	70.417
931	Others	Prawn spp.	*Chingri/Icha*	1.186	0.497	8.393	25.151	3.428	48.666	25.381	15.385	26.033	7.703	0.510	1.619	6815.319	15.919
945		*Crab sp*	*Kakra*	–	–	–	–	–	–	–	–	0.017	–	–	–	1.918	0.004
	Subtotal			1.186	0.497	8.393	25.151	3.428	48.666	25.381	15.385	26.050	7.703	0.510	1.619	6817.237	15.924
	Grand total			100	100	186	100	100	100	100	100	100	100	100	100	42811.872	100

Note: – denotes zero catch

On floodplains outside the FCD a total of 16 fish species were categorised as dominant i.e. those comprising 1% or more of the total annual catch and all but one were floodplain residents (Table 7.9). Inside the FCD, there were 23 dominant species, 20 of which were floodplain residents and 4 migratory species comprising three carps, *rui*, *catla* and *kalbaus* and one catfish, *ayre*. The compositions of the dominant floodplain residents were fairly similar between sites inside and outside the FCD although the relative abundance of some species differed between sites. Of the 22 species listed in Table 7.9 there were 12 species common to inside and outside sites. Of the remaining 11 species, only *bheda* and *foli* were particularly common (>4% of catch). The former was found outside and the latter inside the FCD. The most abundant species both inside and outside were *puti*, *taki* and *shol*. However, *shol* was relatively less abundant inside the FCD compared with outside as too were *koi*, *khalisha* and *shingi* all of which were particularly common outside.

Table 7.12 Percentage contribution of riverine, migratory and floodplain resident species to the total annual catches outside and inside FCD projects in the South West Region, March 1993 - February 1994

FCD Project	In/Out FCD	% Total Annual Catch		
		Riverine	Migratory	Floodplain resident
Chatla-Fukurhati	Out	<0.1	2.6	93.6
	In	0.7	13.0	70.4
Satla-Bagda Polder 1	Out	<0.1	1.9	96.4
	In	<0.1	1.6	90.6

Note: See text for definitions of habitat preference categories (section 5.1.2)

Prawns were important both inside and outside the FCD scheme but were especially abundant inside where they formed 16% of the total annual catch compared with about 4% of the catch outside.

Of the 13 migratory species recorded outside the FCD scheme, only one, the large silurid catfish, *boal*, comprised more than 1% of the annual catch. The rarer species included four carps, three bagrid catfish, one schilbeid catfish, one other silurid catfish, two minnows and one notopterid. All these species were also found in the adjoining drainage canal (site SW08), where again their abundance was generally low and only two species, *rui* and *catla* formed

more than 1% of the annual catches. In the North Central Region a higher proportion of major carps was also found in *khals* compared to floodplains (Supporting Volume No. 1). On floodplains inside the Chatla-Fukurhati Project, 8 of 23 migratory species were carps which together totalled about 9% of the catch while the composition of the remaining species was very similar to that found outside the scheme. In contrast to floodplains outside the FCD, the relative abundance of carp, particularly major carps, *rui* and *catla*, was higher on floodplains than in canals. Most carp were captured in *kua* during the winter when they comprised between 8% and 33% of monthly catches. This suggests that they were more strongly attracted to the shelter offered by these artificial residual waterbodies than those of adjoining *khals* and rivers. This feature has implications for the potential use of *kua* as fish sanctuaries which could form an important component of future capture fisheries development programmes in this region and in other parts of Bangladesh where *kua* are used extensively.

A major difference was seen in species richness between floodplains inside and outside the FCD (Fig. 7.12). Examination of catch compositions revealed that the greater species richness found inside the FCD was due solely to the larger number of riverine and migratory species (Table 7.13). Examination of distributions of individual species between linked river and floodplain habitats, revealed clear differences between inside and outside sites (Table 7.14). The results indicated seasonal movements of many species, particularly riverine species, between the Arial Khan River and floodplains inside the Chatla-Fukurhati Project, whilst the same species showed very little movement between the Kumar River and the floodplains outside the FCD scheme. This supports the view that there was substantially less hydrological linkage between river and floodplains outside the FCD scheme. Reasons for this have been discussed earlier in the report (section 3.3).

Table 7.13 Total annual number of fish species, classified by habitat preference, recorded from floodplains outside and inside the Chatla-Fukurhati Project, March 1993 - February 1994

Sites	Number of species			
	Riverine	Migratory	Floodplain Resident	Total
Outside FCD (SW09 + SW10)	1	12	45	58
Inside FCD (SW05 + SW06)	16	21	43	80

Note: See text for definitions of habitat preference categories (section 5.1.2)

Table 7.14 Seasonal variation in the distribution of riverine and migratory fish between rivers and floodplains outside and inside the Chatla–Fukurhati Project

Site name	Year: 1993											Year: 1994	
	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Species:	*Rani(Code 28)*												
Arial Khan	■		■										
Inside FCD						■	■		■				
Kumar			■								■	■	■
Outside FCD													
Species:	*Kachki(Code 58)*												
Arial Khan	■	■	■		■	■				■	■	■	
Inside FCD								■	■				
Kumar	■	■	■								■	■	■
Outside FCD													
Species:	*Phasa(Code 193)*												
Arial Khan			■	■						■	■	■	
Inside FCD								■	■				
Kumar			■	■	■				■		■	■	
Outside FCD													
Species:	*Kajuli(Code 02)*												
Arial Khan	■	■		■		■	■	■	■	■	■	■	■
Inside FCD							■	■	■				
Kumar				■	■	■	■	■	■	■	■		
Outside FCD													
Species:	*Ghaura(Code 51)*												
Arial Khan	■	■	■	■	■	■		■	■	■	■	■	■
Inside FCD						■	■	■	■				
Kumar	■	■	■	■	■			■	■	■	■	■	
Outside FCD													
Species:	*Shillong(Code 196)*												
Arial Khan			■			■		■		■	■		
Inside FCD								■	■				
Kumar	■	■	■		■								
Outside FCD													
Species:	*Gang tengra(Code 81)*												
Arial Khan	■									■	■	■	
Inside FCD								■	■				
Kumar						■					■	■	■
Outside FCD													

Note: Shading denotes presence of species, no shading denotes absence

(Cont.)

Table 7.14 Seasonal variation in the distribution of riverine and migratory fish between rivers and floodplains outside and inside the Chatla–Fukurhati Project

Site name	Year: 1993 Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year: 1994 Jan	Feb
Species:	*Kabashi(Code 132)*												
Arial Khan	■	■		■	■				■				
Inside FCD	■				■	■	■	■	■		■		
Kumar			■	■				■	■	■			
Outside FCD													
Species:	*Guizza(Code 135)*												
Arial Khan													
Inside FCD							■		■				
Kumar		■	■	■									
Outside FCD													
Species:	*Katari(Code 188)*												
Arial Khan	■	■	■							■		■	■
Inside FCD				■		■		■	■	■			
Kumar	■	■									■	■	
Outside FCD		■											
Species:	*Fulchela(Code 189)*												
Arial Khan			■	■		■	■		■	■		■	■
Inside FCD					■	■	■	■	■	■		■	
Kumar	■	■	■	■	■	■		■	■	■	■	■	■
Outside FCD												■	
Species:	*Chapila(Code 86)*												
Arial Khan	■	■	■							■	■	■	
Inside FCD					■		■	■	■				
Kumar	■	■	■								■	■	■
Outside FCD													
Species:	*Bacha(Code 76)*												
Arial Khan									■	■			■
Inside FCD						■	■	■	■				
Kumar		■	■					■					
Outside FCD													

Note: Shading denotes presence of species, no shading denotes absence