

**ANNUAL REPORT
OF THE
NATIONAL RESEARCH CENTRE
ON COLDWATER FISHERIES**

1989-90



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Haldwani - 263 139 Dist. Nainital, U. P., India

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FOR THE YEAR 1989-90

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1. Brief History

The research on coldwater fisheries commenced with the establishment of Coldwater Fisheries Research Centre of erstwhile Central Inland Fisheries Research Institute (CIFRI) in 1963 as a scheme under III Five Year Plan. The research programme at the Centre commenced on borrowed facilities provided by the States of Himachal Pradesh and Jammu & Kashmir. This Centre, for the first time, enriched our knowledge on resource management, biological productivity of torrential rivers, streams, brooks, lakes, reservoirs, etc. both in the Himalayan and Deccan Plateau regions. The Centre monitored the seed resources of commercially important coldwater species particularly schizothracids and mahseers in N.W. Himalayan region. The fishery biology of important coldwater fishes has been studied. In the field of aquaculture technologies of production of common carp, trout and mahseer were standardized with the sole aim of increasing fish yield per unit of water area. For the first time, formulation of dry pelletized practical feeds met with crowning success in brown and rainbow trouts. Monitoring of fish health in coldwater hatcheries and farms and their remedial measures resulted in controlling the losses of commercial species which otherwise took heavy toll. In spite of the great strides made in research leading to development of coldwater fisheries, the Centre lacked in its own infrastructure facilities. This constraint resulted in lack of proper thrust in priority areas of research. The Working Group on Agricultural Research and Education for the VII Five Year Plan suggested that the research on coldwater fisheries be strengthened by having a separate National Research Centre on Coldwater Fisheries (Item-4, Page-9 of the Document). The sanction to establish the NRC on Coldwater Fisheries was accorded by the ICAR in December, 1986 and the Centre came into existence at Haldwani in September, 1987. The location of temporary headquarter of the NRC

was decided on the basis of the recommendation made by the Site Selection Committee of the ICAR. The Committee recommended the permanent campus with a fish farm at Champawat. Till such facilities come up at Champawat the Committee approved of its location at Haldwani. It was further decided by the Council that the erstwhile establishment of the Srinagar Research Centre of CIFRI be merged with the NRC on Coldwater Fisheries.

2. Mandate

The mandate of the NRC on Coldwater Fisheries is (i) to conduct research on assessment and management of coldwater fishery resources (ii) to study and monitor factors affecting them (iii) to develop technologies for their improvement and (iv) to conduct training and extension programmes.

3. Organisational Set-up

To develop the infrastructural facilities for accomplishment of research programmes on coldwater aquaculture, flat land measuring 3.3 ha at Champawat in Kumaon Himalaya (Distt. Pithoragarh) as recommended by the Site Selection Committee, was negotiated and purchased in April, 1988. The site is now being developed for research laboratories and farm complex. During 1989-90 the Central Public Works Department completed fencing of the area to prevent encroachment, laying of approach road to the farm complex from the National Highway and a small store shed. The CPWD also awarded the execution of works on construction of hatchery building, raceways, outdoor nursery tanks, indoor circular nurseries, water intake structure for the whole farm and pelletizing, feeding and milling rooms. These works are in progress. To monitor these works a small office has been set up at Champawat with a Scientist (Selection Grade) assisted by technical and supporting staff. The construction and layout plan for the laboratory building has been taken-up with the Chief Architect, Northern Circle, CPWD on an urgent basis.

4. Budget

The position of Budget Estimates and Revised Estimates for 1989-90 under Plan and Non-Plan of the NRC-CWF is as under:

(Rupees in lakhs)

Budget Head	Budget Estimates		Revised Estimates	
	Plan	N. Plan	Plan	N. Plan
i) Estt. Charges	5.00	4.30	6.00	6.40
ii) T.A.	1.00	0.25	1.00	0.20
iii) Other Charges (including equip- met etc.)	6.00	2.00	8.50	2.00
iv) Works	9.00	-	9.50	-
v) Others	-	-	-	-

5. Recruitment

Out of 23 sanctioned posts under Plan, the recruitment of 20 posts, viz., scientific, technical, administrative, auxillary and supporting, has been completed. Recruitment action for filling three posts of scientists is pending with ASRB.

6. Foreign Visits

Dr. K.L. Sehgal, Project Director participated in the Seminar on Fisheries Research Management organised by FAO/DANIDA at Phuket (Thailand) from September 11-22, 1989.

Dr. C.B. Joshi, Scientist (Selection Grade) underwent training in trout breeding and culture at the University of Sterling, United Kingdom for a period of six months from October, 1988 to March, 1989.

7. Workshop(s) Conducted

The National Research Centre on Coldwater Fisheries organised a National Workshop on Research and Development Needs of Coldwater Fisheries in India at Haldwani on January 30-31, 1989. In all 30 research papers were presented. The outcome of this National

Workshop resulted in formulating specific recommendations. These are: (i) All the water bodies in the uplands should be under the control of State Fisheries Department for fishing rights and the management of natural fishery resources; (ii) carrying capacity of selected mountain streams/lakes of the uplands be determined and enhanced; (iii) Enforcement of fishery legislations in upland waters be effectively implemented and possibility of mass awareness for conservation of valuable fish stocks may be explored through extension and voluntary agencies; (iv) Large-scale hatcheries for suitable species of mahseer along the Himalayan belt may be established for repopulating the natural water bodies; (v) Technologies for large-scale artificial propagation of Schizothoracids and Indian trout (Barilius bola) may be evolved; (vi) Evolving of complete/supplementary diets with locally available ingredients for trouts, mahseers and schizothoracids; (vii) Efforts on fish health monitoring of coldwater species may be intensified; (viii) Introduction of cold-tolerant species of common carp for aquaculture in high altitudes may be considered; (ix) Possibilities of introducing sterile/monosex forms of silver and grass carps in coldwater lakes/reservoirs to enhance the fish yield may be explored; and (x) Integrated farming of coldwater fish species may be taken-up in the uplands.

8. Honours, Awards, Etc.

Dr. K.L. Sehgal, Project Director has been awarded the degree of Doctor of Science by the Meerut University for his thesis "Ecology and fisheries of mountain streams of N.W. Himalayas":

Dr. K.L. Sehgal, Project Director was appointed as a Member of the Advisory Group constituted under the UNDP Project entitled, "Sepik River Fish Stock Enhancement, PNG/85/001".

9. Conferences/Symposia/Seminars attended

Sl. No.	Subject	Organisers	Papers presented	Authors/Participants from the Instt.
1.	Annual Workshop of MAB Programme	Deptt. of Environment, GOI, New Delhi	Annual Progress Report on Sub-Project.IX of the BSL Project	Dr. K.L. Sehgal
2.	Seminar on Problems and challenges in conservation and utilization of natural resources of UP Hills.	Uttarakhand Sedh Sansthan, Pantnagar	Aquatic resources of hill districts of UP and their potential for fisheries development	-do-
3.	Symposium on Advances in Limnology and conservation of endangered species	HNB Garhwal University, Srinagar(Garhwal)	i)Hydrobiological profile of R.Sutlej in its middle stretch in Western Himalayas. ii)Culture possibilities of golden mahseer, the endangered fish of Himalayas.	Dr. C.B. Joshi

Drs. Shyam Sunder and H.S. Raina participated in the "Meen Mahotsava" held at G.B. Pant University of Agriculture & Technology, Pant Nagar on March 2, 1990.

10. Meetings Attended

Dr. K.L. Sehgal, Project Director attended the following important meetings during the period under report:

- April/May, 1989 Meeting of the ICAR Directors on zero based budgeting etc. at New Delhi.
- At the request of the Department of Fisheries, U.P., the proposed sites for coldwater fish farms in Garhwal Himalaya, were visited and finalised.
- June, 1989 Meeting of the ICAR Regional Committee No.IV at IVRI, Izatnagar.
- Meeting with the World Bank Team drafted to study the fishery resources held at New Delhi.
- July, 1989 Meeting convened by the Working Group of the Planning Commission under the chairmanship of Dr. M.S. Swaminathan on Agricultural Research & Education at New Delhi.
- August, 1989 Provided guidance/technical know-how in finalising the foreign aided projects in the meeting held with the officials of Department of Fisheries, U.P.
- Meeting convened by the Joint Commissioner of Fisheries, Ministry of Agriculture, Govt. of India as a national member of the Committee on small scale coldwater fisheries project of FAO/UNDP.
- September/
November, 1989 Meeting convened by the Department of Forests and Environment, Govt. of India, as a member on the Committee constituted for studying the environmental aspects of Diu and Chanch Islands.
- International Seminar on Fishery Research Management held at Phuket (Thailand) as a Govt of India (ICAR/DARE) nominee.
- December, 1989 Meeting of the ICAR Regional Committee No.III held at Jharnapani (Nagaland) as a special invitee.
- Seminar on Fishery Research and Education at CIFE, Bombay.
- February, 1990 Meeting convened by the UP Council of Agricultural Research, Lucknow.
- March, 1990 Seminar convened by Uttarakhand Sodh Sansthan at Pantnagar to discuss the problems/challenges being faced in conservation of the natural resources of UP Hills.

11. Visitors

The following top ranking fisheries experts visited the Institute during the period and they were apprised of the activities going on at the NRC on Coldwater Fisheries:

1. Dr. P.V. Dehadraj, Deputy Director-General (Fisheries), Indian Council of Agricultural Research, New Delhi.
2. Dr. V.G. Jhingran, Ex-Director, Central Inland Fisheries Research Institute, Barrackpore.
3. Dr. C.V. Kulkarni, Ex-Director of Fisheries, Maharashtra, Bombay.
4. Dr. Y.R. Tripathi, Ex-Director of Fisheries, U.P., Lucknow.
5. Dr. P. Das, Director, National Bureau of Fish Genetic Resources, Allahabad.
6. Shri V.K. Johri, the then Director of Fisheries, Govt. of U.P., Lucknow.
7. Prof. K.C. Pandey, Head, Department of Zoology, Meerut University, Meerut.
8. Dr. K.D. Pandey, Director of Fisheries, U.P., Lucknow.
9. Dr. C.S. Singh, Professor & Head, Fisheries Research and Training Centre, GB Pant University of Agriculture & Technology, Pantnagar.
10. Shri M.C. Joshi, Director, Defence Agricultural Research Laboratory, Almora.
11. Shri R.F. Gupta, Sr. Hindi Officer, Indian Council of Agricultural Research, New Delhi.
12. Shri M.L. Rastogi, Principal, Centre for Inland Fisheries Operative Training, Lucknow along with a batch of trainees.

12. Library and Documentation Service

The role of library and documentation in a research institute is extremely important. Being a newly established Centre, stress is being given for proper acquiring essential books, periodicals is being given for proper library-building activity. The library of the Centre, in a short span, has acquired about 400 books and 350 scientific journals.

About 20 foreign and Indian periodicals/journals have been subscribed and 200 periodicals including news letters and reports of various Institutes/ICAR were received as gift.

13. Information and Reprography Services

The technical and non-technical queries received from various agencies were attended to by this section. The reports on progress of research were compiled and sent to ICAR from time to time. Research papers of scientists were processed for publication in various journals. The following departmental publications were brought out by NRCCWF during the period under report:

1. Abstract book for the National Workshop on Research and Development Needs of Coldwater Fisheries
2. Final report on the Project entitled "Impact of construction and completion of Beas Project (Stage.I- Beas-Sutlej Link and Stage.II- Pong Dam) on limnology and fisheries of R. Beas".
3. Special Scientific Bulletin entitled, "Twenty Five Years of Research in Coldwater Fisheries".

14. Ongoing Projects

The Kumaon Himalaya has large number of streams and lakes where fish catches have declined due to degradation of environment and human interference. The fishermen catches are extremely poor thus affecting their economic conditions. As a part of fulfillment of mandate of the Institute for management of fishery resources of coldwaters, eco-based investigations of a lake and a stream to increase fish yield have been taken-up. The progress of these research projects are summarized in the following paragraphs:

Project NRC-CWF.1

Eco-based investigations of Khurpatal lake for increasing fish yield.

Location: Haldwani (U.P)

Duration: 1989-92

Personnel:

- Sh. Madan Mohan (from September, 1989)
- Dr. H.S. Raina
- Dr. Shyam Sunder
- Dr. C.B. Joshi (upto September, 1989)
- Sh. B.C. Tyagi (upto August, 1989)
- Sh. Baldev Singh
- Sh. A. Mukhopadhyay (from September, 89)
- Sh. Ravinder Kumar (upto August, 1989)

Lake Khurpatal has been loaned to NRC on Coldwater Fisheries by the UP Forest Department for scientific management of this lake with ultimate aim to increase the level of fish yield. The objective of the project is to develop a model for obtaining sustainable yield of fish in mountain lakes of Kumaon, based on the principles of ecological parameters and culture and capture fisheries. The lake has a total area of 13.0 ha and is located in Nainital district of Kumaon Himalaya (Lat. 29°25' N and Long. 79°21'E) at an elevation of 1600 m above msl. It is a warm-monomictic water body remaining stratified from March to November. The source of water in the lake is from inflow of catchment area and underground seepage. The rocks in the catchment area are predominantly dolomictic type.

For undertaking observations on limnology, three sampling sites were selected: Site No.1 near the village temple to the south of the lake; Site No.2 towards the roadside to the north of the lake; and Site No.3 on the village side to the east of the lake. In addition, sampling was also done at the centre of the lake.

Water Quality:

The abiotic parameters of the lake water at three sampling sites ranged as follows: water temperature 12.0-28.0°C; secchi disc 1.2-4.0m pH 7.6-8.4; dissolved oxygen 8.6-10.0 mg/l; free carbon dioxide 0.25-2.5 mg/l; total alkalinity 69-162 mg/l; chlorides 11.0-21.6 mg/l; calcium 57-87 mg/l; magnesium 1.8-3.0 mg/l; DOM 12.6-26.1 mg/l

specific conductance 300-380 μ mhos; and oxygen saturation 110-160%.

Primary Production:

The gross primary productivity of the lake water ranged between 65.5-110.0 mg C/m³/hr at the surface against 52.5-98.0 mg C/m³/hr at the bottom.

Plankton:

The analysis of samples of phytoplankton have given density between 2.7×10^4 - 17.6×10^4 units/l at Site No.1; 1.5×10^4 - 10.0×10^4 units per litre at Site No.2 and 1.6×10^4 - 16.1×10^4 units/l at Site No.3. The major groups of phytoplankton communities were Dinophyceae, Bacillariophyceae and Chlorophyceae in order of abundance. Their respective ranges were 44-97%, 3-56% and nil-2% at Site No.1; 49-99%, 1-45% and 4-6% at Site No.2 while it was 19-98%, 2-81% and 1-3% at Site No.3. The phytoplankton density at different depths of central zone varied between 1.7×10^4 - 17.6×10^4 units/l. The major groups comprised Dinophyceae (20-100%), Bacillariophyceae (3-78%) and Chlorophyceae (1-5%). These groups were dominated by Sphaerodinium cinctum, Peridinium palatinum, Glenodinium quadridens and Ceratium hirudinella among Dinophyceae; Navicula, Cymbella, Pinnularia, Amphora, Diatomella, Surirella, Frustulia among Bacillariophyceae and Cosmarium punctulatum among Chlorophyceae.

In the littoral zone of the lake, the density of zooplankton varied between 48-310 units/l at Site No.1; 56-206 units/l at Site No.2 and 42-213 units/l at Site No.3. The major zooplankton communities included Protozoa, Rotifera, Cladocera and Copepoda in densities of nil-8.5%; 8.0-69.2%; nil-11.0% and 30.1-86.6% at Site No.1; nil-3.5%; 12.0-70.0%, nil-5.7% and 21.7-86.0% at Site No.2 and nil-4.5%; 12.5-71.4%; nil-5.2% and 28.6-83.0% at Site No.3. At the central zone the density ranged between 300-536 units/l represented by Rotifera (38.9-58.9%), Cladocera (15.1-29.0%) Copepoda (16.0-33.0%) and Protozoa (nil-13.0%). The predominant taxa of zooplankters recorded were Nebela acuminata, Diffugia oblonga, and Quadrullella symmetrica among Protozoa; Anuraeopsis fissa,

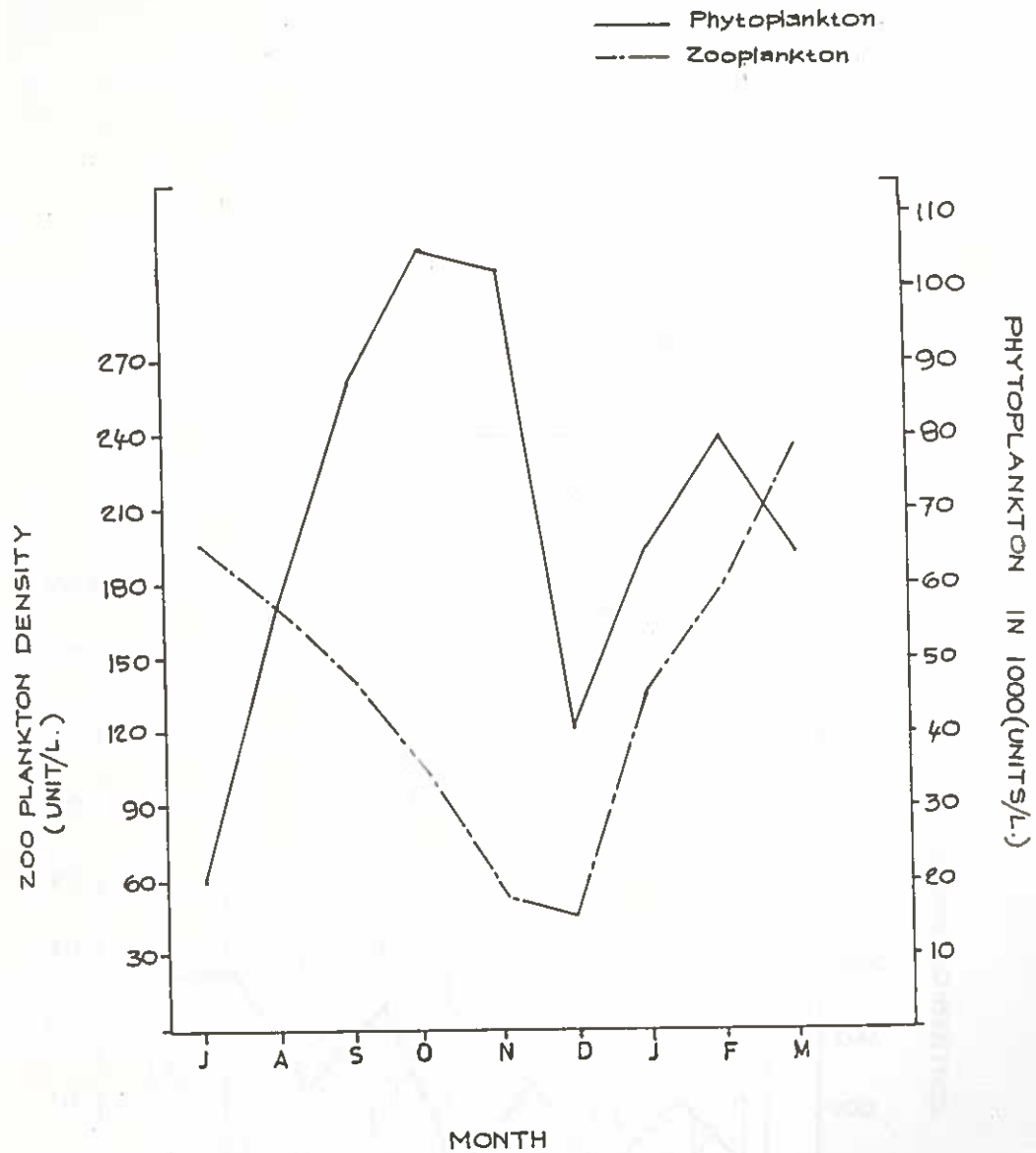


FIG. 1 : MONTHLY VARIATIONS IN PHYTO-AND ZOOPLANKTON IN LAKE KHURPATAL.

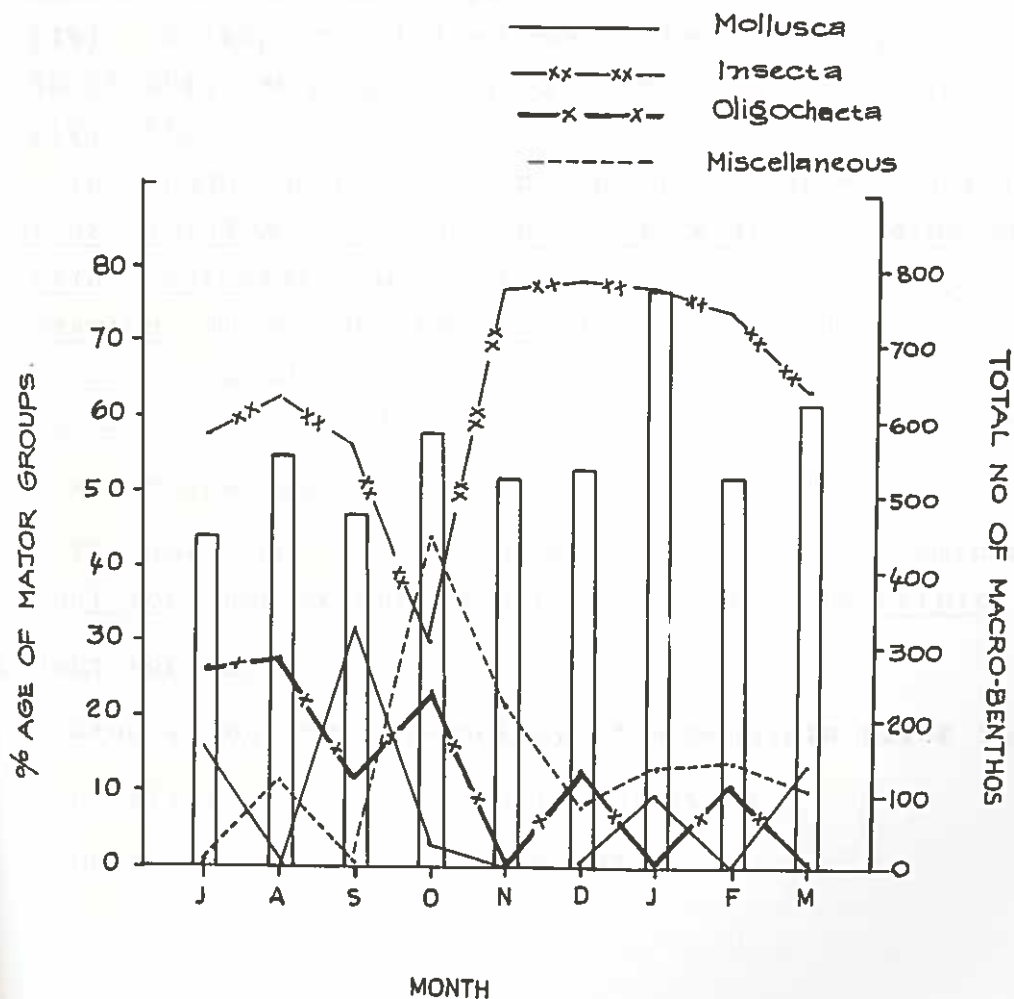


FIG. 2 : MONTHLY FLUCTUATIONS IN TOTAL NUMBERS AND MAJOR GROUPS OF MACRO-BENTHOS IN LAKE KHURPATAL.

Keratella cochlearis, Monostyla bulla among Rotifera; Daphnia similis, Alona intermedia and Alonella exisa among Cladocera and Cyclops sp. and Mesocyclops leuckarti among Copepoda (Fig.1)

Benthos:

The macro-benthic fauna at three sampling sites of the lake varied between 311-667 ind/m² at Site No.1; 400-800 ind/m² at Site No.2; and 444-933 ind/m² at Site No.3. Their respective biomass varied between 4.650-39.770 g/m², 7.800-59.810 g/m² and 8.070-51.560 g/m². The benthic biota were represented by Oligochaeta (nil-3.29%), Hirudinea (nil-20.39%), Ephemeroptera (nil-24.05%), Odonata (2.02-64.14%), Coleoptera (nil-3.54%), Hemiptera (nil-6.84%), Diptera (4.66-53.10%), Mollusca (nil-27.89%) and miscellaneous items (nil-12.21%) (Fig. 2).

The predominant forms recorded at three sampling Sites were: Tubifex tubifex, Limnodrilus hoffmesteri, Aelosoma niveum and Pristina bilongata among Oligochaeta; Gomphus, Ophiogomphus and Coenagrion among Odonata; Ranatra among Hemiptera; Chironomus and Chaborus among Diptera; Caenis among Ephemeroptera; Hydrophilus and Haliphus among Coleoptera while Lymnaea and Gyraulus among Mollusca.

Fish and Fisheries

The lake has no commercial fisheries. The dominant species are Tor putitora and German phenotypes of Cyprinus carpio.

PROJECT NRC-CWF.2:

Studies on the bio-ecology of a mountain river in Kumaon.

Location: Haldwani (U.F)

Duration: 1989-91.

personnel:

Dr. Shyam Sunder

Dr. H.S. Raina

Sh. Madan Mohan (from September, 89)

Dr. C.B. Joshi (upto September, 89)

Sh. B.C. Tyagi (upto August, 1989)

Sh. Baldev Singh (from September, 89)

Sh. A. Mukhopadhyay (from September, 89)

Sh. Ravinder Kumar (upto August, 89)

The Gola River is wholly a lesser Himalayan stream draining 600 km² watershed in the south-central part of Kumaon and located at an elevation from 500-2610 m above msl (29°17'-29°27': 79°26'). After flowing westwards, it takes a turn towards south from where it again meanders towards western side and receives Nalena Nadi from Nainital at Ranibagh. From here the river flows in a southward direction. At Kathgodam, a barrage has been constructed to meet the requirement of irrigation and drinking water of the 'Bhowar' area of Terai region. The river receives its major share of water as a result of monsoon run-off. At Jamrani, a multi-purpose dam is proposed to be constructed to utilize this run-off, about 15 km upstream of the present barrage. The primary objective of undertaking the project is to assess the biological productivity of the R. Gola and the possible ways to enhance fish stocks.

The investigations are being made at three sampling sites, viz., (i) near the proposed Jamrani dam site; (ii) 2 km upstream of HMT watch factory; and (iii) 3 km downstream of the same.

Water Quality:

The abiotic parameters of R.Gola recorded at three sampling sites included water temperature, pH, dissolved oxygen, free carbon dioxide, total alkalinity, chlorides, calcium, magnesium and specific conductivity. Their respective values during the period under report ranged as follows: 16.0-25.5°C; 7.6-8.4; 8.6-12.0 mg/l; nil-1.4 mg/l; 48-127 mg/l; 8-18 mg/l 40-58 mg/l; 2.1-3.0 mg/l and 110-240 μ mhos. Oxygen saturation values varied between 95-165%. The velocity of water ranged between 0.70-1.60 m/sec. The substrata of the river at three sites ranged from boulders, stones to gravel and sand.

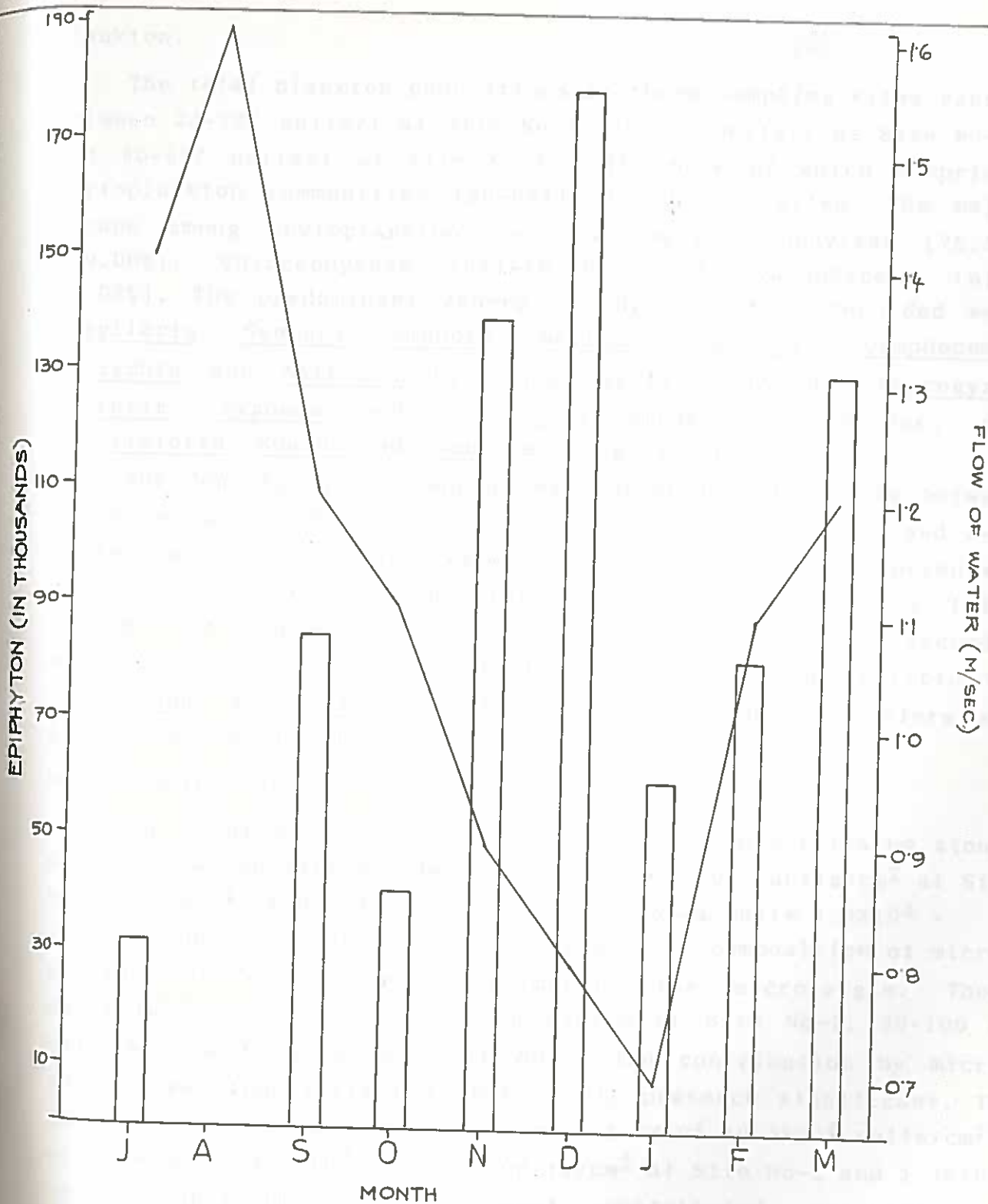


FIG. 3 : MONTHLY FLUCTUATIONS IN EPIPHYTON IN RELATION TO FLOW OF WATER IN R. GOLA.

Plankton:

The total plankton populations at three sampling sites ranged between 24-782 units/l at Site No-1; 26-930 units/l at Site No-2; and 50-652 units/l at Site No-3. The bulk of which comprised phytoplankton communities (90-98%) at all the sites. The major groups among phytoplankton comprised Bacillariophyceae (75.50-100.00%), Chlorophyceae (nil-18.80%) and Cyanophyceae (nil-10.06%). The predominant genera of phytoplankters recorded were Flagilaria, Synedra, Amphora, Navicula, Cymbella, Gomphonema, Nitzschia and Asterionella among Bacillariophyceae; Spirogyra, Ulothrix, Zygnema and Microspora among Chlorophyceae; and Oscillatoria, Nostoc and Anabaena among Cyanophyceae.

The density of zooplankton was insignificant ranging between nil-6 units/l at Site No-1; nil-12 units/l at Site No-2 and 2-16 units/l at Site No-3. The composition of major groups observed was Protozoa (nil-100.00%), Rotifera (nil-66.67%), Cladocera (nil-16.66%) and Copepoda (nil-58.33%). The predominant taxa recorded were Arcella, Centropyxis, Diffugia and Nebela among Protozoa; Asplanchna, Keratella, Monostyla and Lecane among Rotifera and Bosmina and Alona among Cladocera.

Micro-benthic Biota:

The total micro-organisms growing over the substratum stones of the Gola bed varied between 3.5×10^4 - 19.6×10^4 units/cm² at Site No-1; 4.0×10^4 - 24.9×10^4 units/cm² at Site No-2 while 1.7×10^4 - 14.5×10^4 units/cm² at Site No-3 (Fig.3). The composition of micro-benthic biomass comprised primarily the micro-algae. Their percental values varied between 89-100 at Site No-1; 90-100 at Site No-2 and 78-100 at Site No-3. The contribution by micro-animals was insufficient to make their presence significant. The density of micro-algae ranged between 3.5×10^4 - 19.6×10^4 units/cm² at Site No-1; 4.0×10^4 - 24.3×10^4 units/cm² at Site No-2 and 1.3×10^4 - 13.9×10^4 units/cm² at Site No-3 contributed primarily by Bacillariophyceae (63-100%), Chlorophyceae (nil-37%) and Cyanophyceae (nil-17%). The micro-algae was dominated by taxa of Cymbella, Navicula, Amphora, Flagilaria, Synedra, Caloneis, Cocconeis and Rhopaledia among Bacillariophyceae.

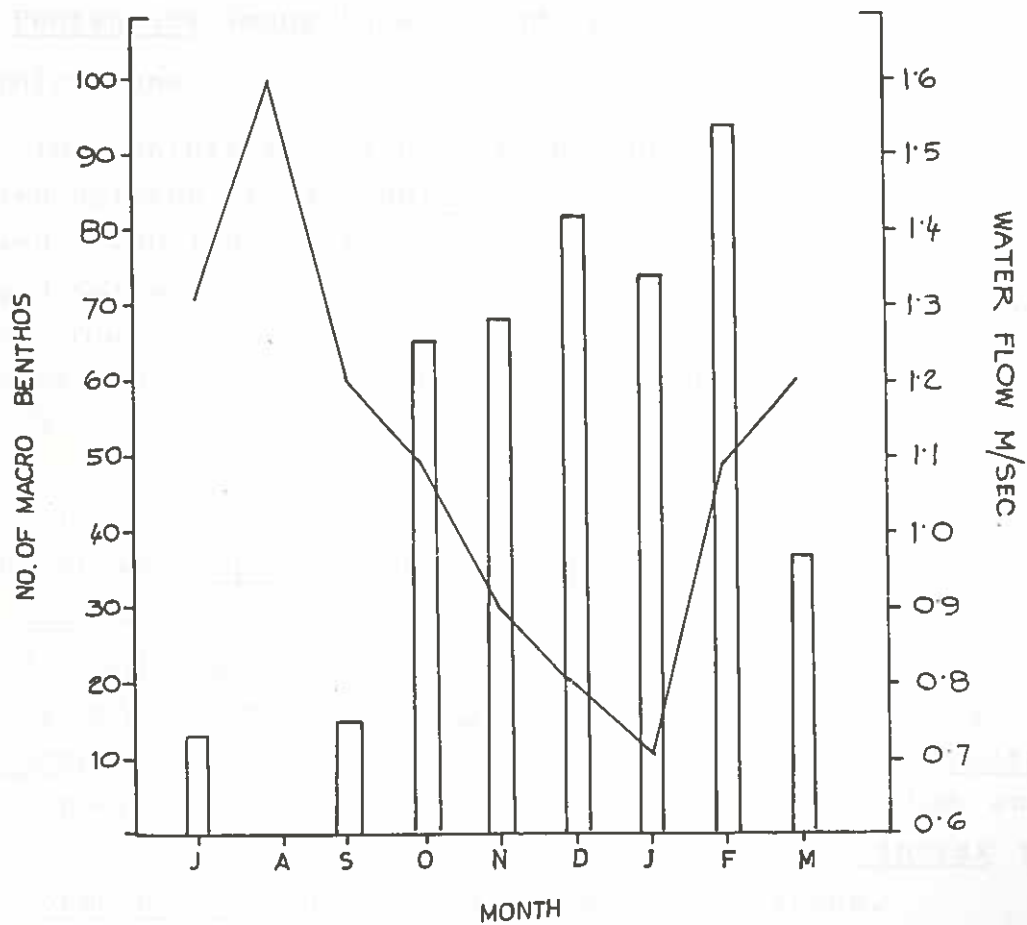


FIG. 4 : MONTHLY VARIATIONS AMONG BENTHIC-MACRO-FAUNA IN RELATION TO WATER FLOW IN R. GOLA.

The contribution by micro-animals varied between 3.3×10^3 - 6.8×10^3 units/cm² at Site No-1; 6.2×10^3 - 12.5×10^3 units/cm² at Site No-2; and 1.3×10^3 - 6.7×10^3 units/cm² at Site No-3. The major micro-animals abundant at the bottom included Protozoa (nil-100%), Rotifera (nil-100%), Turbellaria (nil-84%) and young ones of aquatic insects (nil-20%) represented by Epistylis plicatilis among Protozoa; Ascomorpha, Lecane and Keratella among Rotifera; Chaborus and Pentaneura among insects and Triclad species.

Benthic fauna:

The benthic macrofauna at the three sampling Sites of river bed varied between 11-147 ind/m² at Site No-1; 14-68 ind/m² at Site No-2; and 15-80 ind/m² at Site No-3. Their respective wet biomass ranged between 1.195-8.760 gm²; 4.020-6.100 g/m²; and 0.272-5.100 g/m². The major benthic biota was contributed by young ones of Ephemeroptera (nil-40.69%), Odonata (nil-7.88%), Plecoptera (nil-33.32%), Neuroptera (Nil-1.52%), Coleoptera- adults and larvae (nil-12.0%), Trichoptera (7.69-83.92%), Diptera (nil-23.07%) and miscellaneous group (0.61-24.00%) (Fig. 4). The most common taxa abundant were Epeorus, Baetis, Ephemerella, Heptagenia, Rithrogena, and Iron among Ephemeroptera; Coenagrion and Gomphus among Odonata; Perla, Chloroperla and Nemoura among Plecoptera; Sialis among Neuroptera; Psephenus, Gyrinus and Elmis among Coleoptera; Hydropsyche, Rhyacophyla, Philopotamus and Leucotrica among Trichoptera; Chironomus, Atherix, Tabanus, Simulium and Chaoborus among Diptera; crabs, leeches and fish (Schizothorax richardsonii and Noemacheilus spp.) among miscellaneous group.

Fish and Fisheries:

River Gola abounds in two commercially important fish species, viz., the golden mahseer (Tor putitora) and the snow trout (Schizothorax richardsonii). The other fish fauna recorded were minor carp (Garra gotyla), lesser baril (Barilius bendelisis) and loaches (Noemacheilus spp.).

The estimate of fish density at each sampling site was made by experimental 50 castings with a cast net (mesh 2.5 cm knot to knot) operated in one km of stream length. At Site No-1 catch per unit

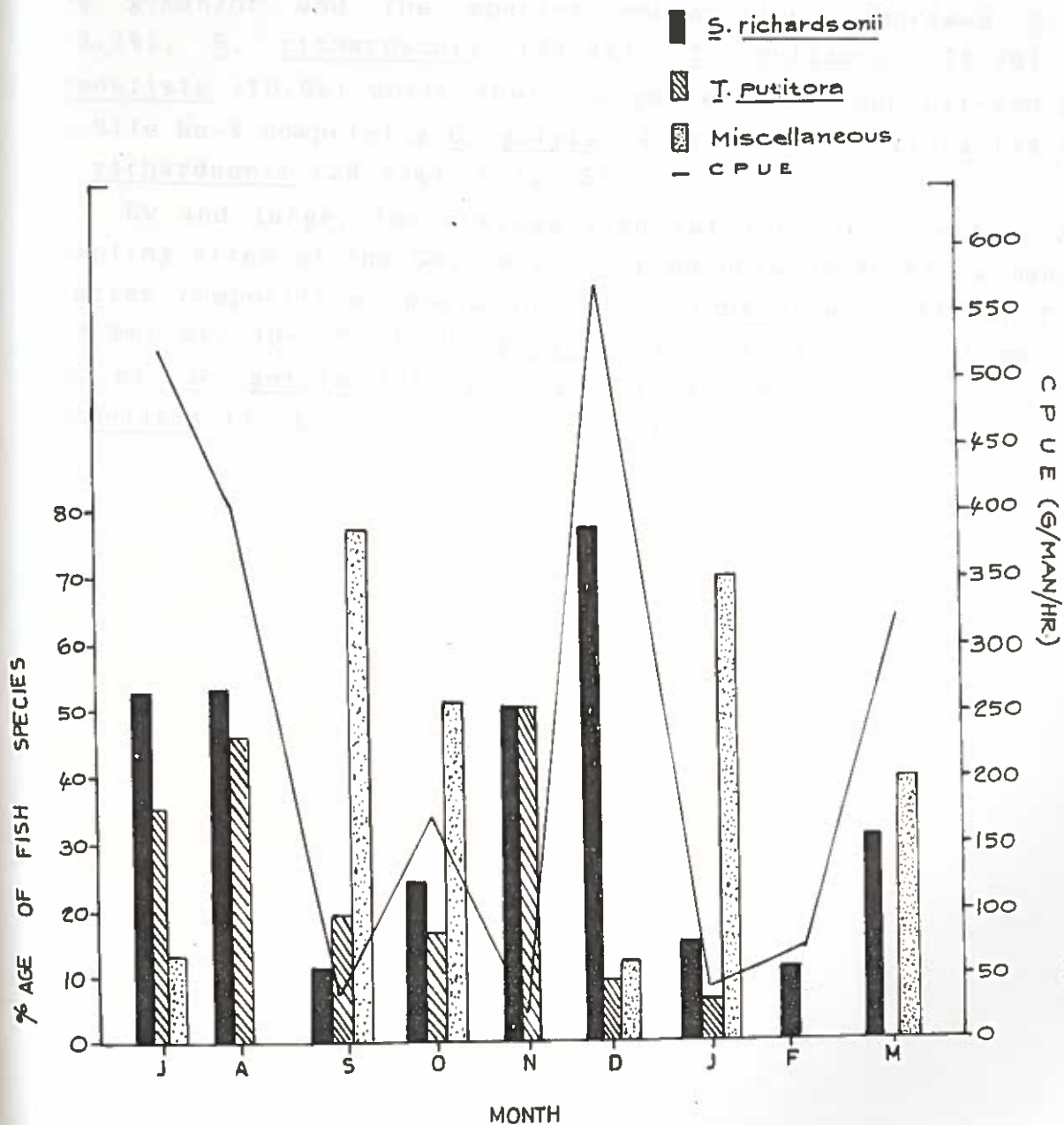


FIG. 5 : MONTHLY VARIATIONS IN FISH SPECIES COMPOSITION AND CPUE (G/MAN/HR) IN R. GOLA.

effort (CPUE) ranged between 170-1480 g/man/hr comprising S. richardsonii (51%), T. putitora (25%), G. gotyla (22%) and B. bendelisis (2%). The CPUE values at Site No. 2 ranged between nil-870 g/man/hr and the species composition comprised G. gotyla (43.3%), S. richardsonii (23.4%), T. putitora (23.3%) and B. bendelisis (10.0%) while their ranges were between nil-300 g/man/hr at Site No-3 comprising G. gotyla (42.86%), T. putitora (28.57%) and S. richardsonii (28.57%) (Fig. 5).

By and large, the average fish catch per unit effort at three sampling sites of the Gola River varied between 80-610 g/man/hr. The species composition consisted of S. richardsonii (33.9%; T.L. 140-310 mm; wt. 40-257 g), T. putitora (25.7%, T.L. 85-210 mm; wt. 20-100 g), G. gotyla (36.3%, T.L. 130-155 mm; wt. 28-52 g) and B. bendelisis (4.1%; T.l. 120-145 mm; wt. 17-25 g).

15. Publications

- Joshi, C.B. Culture possibilities of golden mahseer- the endangered fish of Himalayas. Nat. Seminar on Advances in Limnology and Conservation of endangered fish species, HNB Garhwal University, Srinagar (Garhwal). October 23-25, 1989: 30.
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16. Personnel

The following personnel rendered their services to the Centre during the period under report:

Dr. K.L. Sehgal

Project Director

Scientific:

Sh. Madan Mohan

Principal Scientist

Dr. C.B. Joshi

Scientist (Sel. Grade)

Dr. Shyam Sunder

-do-

Dr. H.S. Raina

-do-

Sh. B.C. Tyagi

-do-

Administrative:

Sh. Mani Ram

Asst, Adm. Officer (upto 30.10.89)

Sh. Mahesh Lal

Assistant (upto 31.08.89)

Sh. G.C. Joshi

Assistant (wef 17.02.90)

Sh. K.V.V.S. Narayana

Steno to Director

Sh. R.L. Raina

Senior Clerk

Sh. Manni Lal

Junior Clerk

Sh. Harish Ram

Junior Clerk

Sh. Bhawan Singh Gwal

Junior Clerk (upto 20.10.89)

Ms. Khilawati Sayana

Junior Clerk (wef 07.11.89)

Technical:

Sh. Feyush Punia

Tech. T-4 (upto 28.02.89)

Sh. Mohan

Tech. T-4 (upto 06.01.90)

Sh. Soran Singh

Tech. T-II-3 (upto 31.08.89)

Sh. Soumitra Roy

Tech. T-II-3 (wef 31.01.90)

Sh. Baldev Singh

Tech. T-2

Sh. A.Mukhopadhyay

Tech. T-1

Sh. Ravinder Kumar

Tech. T-1

Auxillary:

Sh. Bakshi Ram

Driver

Sh. Bhagwan Singh

Driver

supporting:

Sh. Madan Lal	S.S.Gr.IV
Sh. Japhu Ram	S.S.Gr.III
Sh. Sant Ram	S.S.Gr.II
Sh. Hansa Datt	S.S.Gr.I
Sh. J.C. Bhandari	S.S.Gr.I
Sh. Gopal	S.S.Gr.I
Sh. Ravinder Kumar	S.S.Gr.I
Sh. Om Raj	S.S.Gr.I
Sh. M.S. Rana	S.S.Gr.I
Sh. R.K. Arya	S.S.Gr.I
Sh. H.S. Chauhan	S.S.Gr.I

Appointments:

The following appointments were made at the Centre during the period under report:

Name	Designation	
Sh. Madan Mohan	Principal Scientist	wef 13.07.89
Sh. G.C. Joshi	Assistant (on deputation)	wef 17.02.90
Sh. B.S. Gwal	Jr. Clerk	wef 15.09.89
Ms. Khilawati Sayana	Jr. Clerk	wef 07.11.89
Sh. Mohan	Tech. T-4	wef 05.12.89
Sh. Soumitra Roy	Tech. T-II-3	wef 31.01.90
Sh. M.S. Rana	S.S.Gr.I	wef 30.08.89
Sh. R.K. Arya	S.S.Gr.I	wef 23.09.89
Sh. H.S. Chauhan	S.S.Gr.I	wef 22.12.89

Transfers:

The following members of the NRC on Coldwater Fisheries were transferred to NRCCWF Office at Champawat during the period:

Dr. C.B. Joshi	Scientist (Sel. Grade)
Sh. B.C. Tyagi	-do-
Sh. Mohan	Tech. T-4
Sh. Soran Singh	Tech. T-II-3
Sh. Ravinder Kumar	Tech. T-1
Sh. Japhu Ram	S.S.Gr.III
Sh. Hansa Datt	S.S.Gr.I
Sh. J.C. Bhandari	S.S.Gr.I