MARLIM

MarLim Ecological Consulting Ltd.
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CORPORATE EXPERIENCE

MarLim Ecological Consulting Ltd. has extensive experience in providing quality, personalized and cost-effective biological and fisheries monitoring and assessment services. Some of our recent projects, listed by project type, have included (additional information on projects is available upon request):

MUNICIPAL & URBAN PROJECTS:

Construction Monitoring:

- **1995 – 2002 Instream Projects (Lower Mainland, Okanagan, Mid-Coast Fraser Valley areas)**

  All Construction, Maintenance & Development Clients (over 45 projects)

  Environmental monitoring for all instream projects usually consists of first preparing and submitting an Instream Works Permit Application or Notification. Once permission has been granted from the Agencies, environmental monitoring was usually done for the duration of each project. At the completion of the projects, comprehensive environmental monitoring reports were prepared and submitted to the client, MWALP and DFO. Detailed notes, photos and often video were obtained during all construction monitoring projects.

- **Lougheed Highway Widening (Coquitlam)**

  Kistritz Consultants, City of Coquitlam

  This project required attending an initial on-site meeting with the contractors (Progressive, CitiWest) and City of Coquitlam Rep to discuss environmental concerns at the site. The daily monitoring of the Contractor that was hired to clear vegetation from the stream bank, install culverts and place fill along the banks of the stream. Monitoring work for this project was completed in 2000 and a report was submitted.

- **PoCo Trail Construction and Extension (Port Coquitlam)**

  Kistritz Consultants Ltd. - Richmond, and City of Port Coquitlam

  Construction monitoring was done at all sites where: excavation was required adjacent to fish bearing watercourses; concrete was being poured and asphalt was being placed. Any wash water used during the concrete work was tested for pH prior to being discharge into the storm sewer system. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment. This project was completed in 2000.

- **Duprez Ravine Phase II Channel Stabilization (White Rock)**

  City of White Rock

  This project required the daily monitoring of a Contractor that was hired to place angular riprap along the ravine bottom and banks to prevent further erosion of the channel substrate. Further work in the ravine will require ongoing monitoring and subsequent follow-up work.

- **Duprez Ravine Inlet Reconstruction**

  City of White Rock

  Construction monitoring was done at the south end of the ravine, where concrete was poured, the channel was re-aligned, and where rip-rap was placed on the slope for stabilization.

- **Duprez Ravine Debris Removal**

  City of White Rock

  A thorough assessment of the site was made, where small and large woody debris had been deposited as a result of erosion associated with a severe storm. A contractor's document was prepared detailing the environmental criteria and considerations required for safe removal of the debris, to prevent further erosion and destabilization of the ravine banks. Monitoring was performed before and after debris removal, done by helicopter, and a final report was prepared for the City of White Rock.

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Construction Monitoring (con't):

- **Cougar Canyon Creek & North-East Interceptor Culvert & Sediment Pond Clean-out (Delta)**

  Kistritz Consultants Ltd. - Richmond, and City of Delta

  Environmental monitoring was done at the site where the double concrete culvert and sediment trap were being cleaned of all sediment. Monitoring was also done during the cleanout and revetment of the sediment detention pond East from Westview Road. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment.

- **Serpentine/Nicomekl Lowland Flood Control Project (Surrey)**

  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Construction monitoring was done at all sites where: culverts were being installed, upgraded or cleaned; ditches were being cleaned or excavated; off-channel pond was being constructed; dykes were being serviced or built. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment. This project is ongoing and will likely continue into 2003.

- **Oak Street Bridge Seismic Upgrades**

  Ministry of Highways, R.U. Kistritz Consultants Ltd.

  Construction monitoring was undertaken for rock placement, drilling and water turbidity levels during the seismic upgrades on bridge supports on the south shore of the Fraser River. Photographs and notes were used to submit a daily monitoring report.

- **156th Street Channel Widening & Dyke Works – Bear Creek (Surrey)**

  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Construction monitoring was done at the site where the channel was being excavated, culverts were being installed, and the dyke tie-in was being installed. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment.

- **Bothwell Drive & 92nd Avenue Ditch Widening and Serpentine River Tie-in – Serpentine River (Surrey)**

  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Construction monitoring was done at the site where the ditches were being modified, channel was being excavated, culverts were being installed, and the dyke tie-in was being installed. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment.

- **80th Avenue & Harvey Road Culvert Installation and Ditch Cleanout – Serpentine River Tributary (Surrey)**

  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Construction monitoring was done at the site where a new culvert was being installed under 80th Ave. and the associated ditches were being cleaned out. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment.

- **Upper Serpentine River (North & South from 88th Ave.) and Swanson Brook Channel Works and Dyke Upgrade – Serpentine River (Surrey)**

  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Construction monitoring was done at all sites where: culverts were being installed, upgraded or cleaned; ditches were being cleaned or excavated; off-channel pond was being constructed; and dykes were being serviced or built. Detailed notes and photos were taken during monitoring and reports were submitted to the client and/or the Ministry of Environment.

Additional Monitoring projects are listed in the Marine Foreshore Development section.

MUNICIPAL & URBAN PROJECTS (CON'T):

Fish Salvage:

- **1996 – 2002 Instream Projects (Lower Mainland, Fraser Valley areas)**
  All Construction, Maintenance & Development Clients (over 25 projects)

  Prior to instream works commencing, fish & amphibian salvages were undertaken. Distances of the areas needing salvage ranged from 20 metres to well over 2000 metres at the sites. The salvage sites varied from roadside drainage ditches to rivers with widths greater than 8 m. Some sites required isolation with the use of steel plates while others only needed stop-nets. In many cases, Gee minnow trapping was done for a minimum of 8 hours in order to remove smaller fish and/or amphibians. 3-pass electrofishing fish salvage was then performed at each site, if water level and conductivity permitted, using a backpack electrofisher. A Fish Salvage report was submitted to the client's, MWALP & DFO, including a catch summary detailing the numbers and species of fish caught, the equipment used, methodology, and a detailed description and photographs of the location. A description of the some of these projects is as follows:

- **Lougheed Highway Widening (Coquitlam)**
  Kistritz Consultants, City of Coquitlam

  Prior to the construction phase of this project starting, we applied for and obtained the necessary DFO and MELP fish sampling/salvage permits, designed and undertook and extensive fish salvage in the portion of the ditch along Lougheed that would been affected by the construction works. Once the fish salvage was complete, a stopnet and several check-dams were left in place to isolate the work site from downstream fish bearing waters. A fish salvage summary report was submitted to DFO at the completion of this project.

- **Cougar Canyon Creek, NE Interceptor Culvert & Sediment Pond Clean-out (Delta)**
  Kistritz Consultants Ltd. - Richmond, and City of Delta

  Prior to the contractor commencing work in the stream and sediment pond, fish salvage was undertaken. The stream flow was first blocked, and the water was diverted around the work site using a 4" pump. Fish salvage was then performed using a backpack Electrofisher and all fish captured were transported upstream from the worksite. Detailed notes and photos were taken during the salvage operation and reports were submitted to the client and/or the Ministry of Environment.

- **Serpentine/Nicomekl Dyke Upgrades (Surrey)**
  Kistritz Consultants Ltd. - Richmond, City of Surrey, and Double M Contracting

  Where work in the channel was required (i.e., culvert extension, replacement or installation; ditch cleanout, etc.) fish salvage was first undertaken. The stream flow was blocked, diverting the water around the work site using a 4" pump where required. Fish salvage was then performed. Detailed notes and photos were taken during the salvage operation and reports were submitted to the client and/or the Ministry of Environment. These salvage projects commenced in 1998 and are ongoing. Sites have included at least 40 different locations between Mud Bay upstream to the headwaters of the Serpentine River.

- **Upper Serpentine River Channel Widening and Dyke Upgrade (Surrey)**
  Kistritz Consultants Ltd. - Richmond, City of Surrey, and Double M Contracting

  Fish salvage was undertaken over a period of 3 weeks for an 800-metre section of the Serpentine River by working on 100m sections at separate times. The worksite was first isolated by installing steel plates at both the upstream and downstream ends of the site. Water was then diverted around the work site, and water from within the worksite was then pumped out. Stop nets or wire mesh baskets, used as fish barriers, were secured around pump-intakes. Fish salvage was then performed using a backpack Electrofisher and all fish captured were transported upstream from the worksite. Detailed notes and photos were taken during the salvage operation and reports were submitted to the client and/or the Ministry of Environment. This project is ongoing.

- **Latimer Creek Channel De-commissioning (Surrey)**
  GCL Contractors, R.U. Kistritz Consultants Ltd.

  Fish Salvage for a total of 1.2km of stream channel was done over a period of 7 days. Approximately 200m sections of the channel were isolated using stop-nets each day and the 3-pass electrofishing method was employed. Prior to electrofishing, intensive Minnow trapping over a 24-hour period was done to salvage as many juvenile fish as possible. After the salvage was complete, fish were transported upstream from the worksite and the channel was decommissioned.

MUNICIPAL & URBAN PROJECTS (CON'T):

Habitat Value and Fish Use Studies:

- **Serpentine/Nicomekl Lowland Ditch Fish Inventory (Surrey)**
  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  Fish sampling and habitat assessments were undertaken to help determine the type of pump to be used ("fish friendly" or not) at 11 proposed new pump stations. The pump stations are part of the dyke improvements/upgrades for the Serpentine Flood Control Project. This project is ongoing.

- **Serpentine/Nicomekl Lowland Flood Control Project - Latimer Creek Fish Use Study (Surrey)**
  Kistritz Consultants Ltd. - Richmond, and City of Surrey Engineering Dept.

  This project involves the design and implementation of a fish sampling program to determine the habitat value and use of the downstream portion of Latimer Creek. This portion is to be eventually relocated and will require habitat construction and compensation based on the findings of the current study.

- **Latimer Creek, Upper Serpentine River, Bear Creek, Hook Brook, Mud Bay and Inter-River Functional Studies and Dyke Upgrades (Surrey)**
  City of Surrey & R.U. Kistritz Consultants Ltd.

  Summer and over-wintering fish use was studied in order to determine mitigation requirements and to aid in locating sites requiring floodgate upgrades and/or fish-friendly pumps. Fish salvage was then performed prior to construction work beginning. After all fish were removed from the site and relocated, construction work was monitored to completion. Monitoring reports were then submitted the MELP.

- **Serpentine Lowlands Drainage Ditch**
  Phoenix Environmental Services Ltd.

  A fish inventory and habitat assessment was undertaken in a drainage ditch east from King George Hwy. to determine fish presence/absence and habitat quality prior to installation of a drainage pump.

Habitat Assessment & Mapping:

- **Shelly Creek Fish Habitat & Impact Assessments (Parksville)**
  City of Parksville

  A study was undertaken on reaches of Shelly Creek within the Parksville City and Regional District boundaries to: perform a field inventory of riparian areas as they relate to fish habitat; collect fisheries and stream inventory data; identify, document and comment on stream impacts in the Shelly Creek drainage; determine what fish species and if water quality are at risk to observed and future impacts in the watershed; identify areas of fish habitat and water quality concerns that need to be examined in qualitative field surveys; identify preliminary restoration rehabilitation or remedial strategies; and where appropriate to identify preliminary project objectives, scope, cost estimate, and priorities. This project was completed in December 1998.

- **Pepin Creek Stream and Habitat Mapping - Aldergrove Lake Regional Park (Aldergrove)**
  Kistritz Consultants Ltd. - Richmond, and GVRD

  A stream inventory map was completed, with a detailed Appendix attached, for the portion of Pepin Creek within the park boundary of Aldergrove Lake Regional Park. All historical inventory information on the study area was obtained and fieldwork was undertaken to fill in critical gaps in the existing stream inventory information. Watercourses were mapped according to reach units with common biophysical features such as: substrate, gradient or riparian vegetation. Included in the reach information were site-specific issues such as barriers to fish movement, siltation and sedimentation problems, inadequate culverts, pollution point sources, as well as opportunities for habitat enhancement.

- **Instream Flow Assessment (IFA) on Coghlan Creek, Langley**
  KPA Engineering Ltd. - Vancouver and MELP - Surrey

  The focus of this study was on historic data collection for fish habitat/inventory and water quality for Coghlan Creek and a critical evaluation of the Process for Instream Flow Assessment (IFA) on Coghlan Creek in relation to flow required by resident and anadromous fish.

- **Reservoir Carbon Study**
  Powertech Labs Inc. and B.C. Hydro

  Sediment samples were collected using a gravity freeze-core sampler, from five reservoirs in the Columbia River system. Water samples were also collected along with some riparian vegetation samples. All samples were submitted to Powertech Labs for analysis.

FORESTRY RELATED PROJECTS:

Fish & Fish Habitat Inventory and Stream Classification:

- **Fish and Fish Habitat Assessments and Inventory (Prince George)**
  MELP - Prince George and Beak Pacific Inc. - Vancouver

  Studies (June - Sept. 1996, July - Dec 1997) involved supervising and working with a field crew of 8 performing a detailed review of existing fisheries data, helicopter over-flights of study streams, reach delineation, stream sampling using electrofishing and Gee trapping, classification of streams and assessment of fish/riparian habitats and extensive use of various scale maps and aerial photographs. Completed Phase 1 - 6 for a total study area covering 14 TRIM mapsheets with 895 km of streams.

- **Fish and Fish Habitat Assessments and Inventory**
  CANFOR Ltd. and MELP - Chetwynd/Ft. St. John

  Studies involved detailed review of existing fisheries data, helicopter overflights of study streams, reach delineation, stream sampling using electrofishing and Gee trapping, classification of streams and assessment of fish/riparian habitats and extensive use of various scale maps and aerial photographs.

- **Reconnaissance Fish and Fish Habitat Inventory**
  CANFOR Ltd., Industrial Forest Services Ltd. and MELP – Prince George/Netherlands

  These projects involved all aspects of the Chetwynd/Fort St. John studies (above), and additional detailed assessment procedures as outlined in the MELP 1:20 000 Reconnaissance FFHI manual. Projects were completed in 1997.

- **Stream Inventory and Classification (BC Mid-Coast Area)**
  Weldwood of Canada Ltd. and INTERFOR Ltd. - Campbell River & Bella Coola

  Ongoing studies involve helicopter overflights of study streams; reach delineation, stream sampling using electrofishing and Gee trapping, classification of streams and riparian habitats and extensive use of various scale maps and aerial photographs. This work is done on a continuing basis.

WRP, FHAP & IWAP Studies:

- **Weyerhaeuser/Lumby WRP-FHAP (Okanagan)**
  MELP - Penticton and Summit Environmental Consultants Ltd. - Vernon

  This WRP project (started in Oct. 1996) involved a helicopter overflight and video-taping of the watershed, identification of WRP sites, ground-truthing of sites, fish inventory and habitat assessment, site assessments and recommendation for remedial/restoration work. Methods used were as outlined in WRP Tech. Circ. No. 8 and in the Lake & Stream Inventory Manual for Level I and Level II assessments. The draft report for this project was submitted and restoration projects began in 1998. MarLim's component to this project was completed in 1998.

- **Sicamous/Grindrod WRP-FHAP (Okanagan)**
  MELP/MOF - Salmon Arm and Summit Environmental Consultants Ltd. - Vernon

  This WRP project (started in Sept. 1996) involved a helicopter over-flight and video-taping of the watershed, identification of WRP sites, ground-truthing of sites, fish inventory and habitat assessment, site assessments and recommendation for remedial/restoration work. Methods used were as outlined in WRP Tech. Circ. No. 8 and in the Lake & Stream Inventory Manual for Level I and Level II assessments. The draft report for this project was submitted and restoration projects began in 1997. MarLim's component to this project was completed in 1998.

WRP, FHAP & IWAP Studies (con't):

- **Spuzzum Creek WRP (Fraser River Trib.)**
  MELP - Surrey and SNC - Lavalin Inc. - Vancouver

  This WRP project (started in July 1996) involved a helicopter over-flight and videotaping of the watershed, and initial identification of WRP sites. Ground-truthing of sites, fish inventory and habitat assessment, site assessments and recommendation for remedial/restoration work commenced in 1997. MarLim's component to this project was completed in 1998.

- **Peeve Creek WRP (Manning Park)**
  MELP - Penticton and Summit Environmental Consultants Ltd. - Vernon

  This WRP project (started in Aug. 1996) involved a helicopter over-flight and videotaping of the watershed, identification of WRP sites, ground-truthing of sites, fish inventory and habitat assessment, site assessments and recommendation for remedial/restoration work. Methods used were as outlined in WRP Tech. Circ. No. 8 and in the Lake & Stream Inventory Manual for Level I and Level II assessments. The draft report for this project was submitted and restoration projects began in 1997.

- **Bidwell Creek WRP (Chilcotin)**
  MELP & Chendi Enterprises Ltd. - Williams Lake and Summit Environmental Consultants Ltd. - Vernon

  This WRP project (started in Sept. 1995) involved a helicopter over-flight of the watershed, identification of WRP sites, ground-truthing of sites, fish inventory and habitat assessment, site assessments and recommendation for remedial/restoration work. Methods and procedures for this project were followed as outlined in WRP Tech. Circ. No. 8 and in the Lake & Stream Inventory Manual for Level I and Level II assessments. The draft report for this project was submitted and the project was completed in 1996.

- **McDougall & Bellevue Creeks WRP (Okanagan Lake)**
  MOF & West Bank First Nations - Kelowna and Summit Environmental Consultants Ltd. - Vernon

  This study was also initiated in September 1995 and is very similar in scope and detail to the Bidwell WRP study. Both Level I and Level II assessments were done on the two watersheds under study and reporting for this project was completed in 1996.

- **Watershed Restoration Program / Okanagan**
  MELP - Penticton and Summit Environmental Consultants Ltd. - Vernon

  The final reporting for this project was completed in 1996 (fieldwork began in 1994) for the 42 separate streams contained within 5 main watersheds. This project began with an extensive videotaping and habitat/site assessment by helicopter. Ground truthing of priority sites was then done following the Level I assessment as outlined in the Watershed Restoration Technical Circular No. 8. The final result of this project was a prioritized list of potential WRP sites for all of the streams surveyed as well as recommendations for remedial measures.

FORESTRY RELATED PROJECTS (CON'T):

Cutblock Compliance Audit:

- **CFFG Compliance Audits**
  INTERFOR Ltd. and Weldwood of Canada Ltd.

  Environmental audits of forest harvest cutblocks were performed in the Chilliwack and Lillooet Forest Districts for INTERFOR Ltd. and in the mid-coast and Vancouver Island areas for Weldwood of Canada Ltd. and INTERFOR Ltd. to assess regulatory compliance with the Coastal Fisheries Forestry Guidelines (CFFG) for streamside management and road construction practices.

Construction Monitoring:

- **Bridge Construction Monitoring (BC Mid-Coast Area)**
  INTERFOR Ltd. - Campbell River

  Monitoring for the removal of Summit Creek Bridge #1 and construction of the new bridge was done to ensure minimal impact to the stream habitat and water quality of Summit Creek and waters downstream. Previous study findings (MarLim Ecol. Cons. 1994) determined that the riparian class of the stream at this location is "S1". This class designation suggests that all measures possible should be undertaken to minimize stream impacts at this site as well as downstream. The monitoring was to be done by an impartial agency to ensure an unbiased opinion of any impacts to fish habitat and water quality.

Fish Salvage:

- **Mercantile Creek Fish Salvage (Tofino/Ucluelet)**
  MacMillan-Bloedel Ltd., SNC – Lavalin Inc.

  Prior to the contractor commencing the construction of a bridge, fish salvage was undertaken. A 500m section of Mercantile Creek was blocked off on both upstream and downstream ends with hay bales this was further divided into 100m sections using stop nets. A 3-pass electrofishing fish salvage was performed on each 100m section using a backpack electrofisher A Fish Salvage report was submitted to the client, including a catch summary detailing the numbers and species of fish caught, the equipment used, methodology, and a detailed description and photographs of the location.

Marine Foreshore Development Monitoring and Assessment:

- **Dollarton Highway Foreshore Shoreline Protection Works**
  District of North Vancouver, R. U. Kistritz Consultants Ltd.

  Construction Monitoring was performed over a period of four weeks for rip-rap placement on a 500m section of the Burrard Inlet shoreline. Construction activities were documented using notes and photos, and the perimeter silt-fence was checked on a daily basis. Monitoring reports were submitted at the end of each day to the Burrard Estuary Review Committee (BERC).

- **White Rock Foreshore Erosion Protection Works**
  City of White Rock

  This project required permit application preparation and submission to DFO and daily monitoring of a Contractor that was hired to place angular riprap by transporting it along the sand bars at low tide using low impact rubber-track dump-trucks, to repair eroded portions of the East Beach foreshore. Habitat Compensation Plans were designed, including the creation of boulder clusters along the beach to provide permanent habitat for marine life. Monitoring of the colonization of the constructed habitat by marine flora and fauna is ongoing.

- **Barnet Marine Park Foreshore Redevelopment**
  Kistritz Consultants Ltd. and Sandwell Engineering

  Low tide intertidal observations and high tide subtidal SCUBA surveys (including video) were performed to determine the extent of marine life in the study area and to identify potential habitat remediation options and locations. This project will involve subsequent assessment, construction monitoring and habitat compensation. This project is ongoing.

- **Hartley Bay Artificial Reef Monitoring Study**
  Kistritz Consultants Ltd. and Hartley Bay Indian Band

  With boat access from Kitimat on the North Coast, a high-tide SCUBA survey was performed to determine the extent of colonization of marine organisms on an artificial underwater reef. This project will involve subsequent monitoring and is ongoing.

- **Sandspit Marina Impact Assessment Study**
  Westmar Engineering Ltd. and R.U. Kistritz Consultants Ltd.

  SCUBA surveys were performed to determine the extent of the eelgrass growth in the proximity of the proposed marina. Benthic trawl sampling was also done to select an appropriate dredge-spoil dumpsite. This project was completed in 1999.

- **Eelgrass Study at Robert's Bank**
  Dept. of Fisheries & Oceans and R.U. Kistritz Consultants Ltd.

  This study involved collecting of sediment and invertebrate samples using SCUBA, as well as underwater photography. Water quality samples were collected using a plankton pump and all invertebrate samples were counted in MarLim's lab.

Contaminated Site Assessment:

- **Shell Canada Phase I Assessment (Surrey)**
  Mr. Ted Vanderleest

  Groundwater monitoring wells were drilled in the vicinity of the underground fuel storage tanks and groundwater samples were collected and analyzed. This project was undertaken to determine whether the fuel storage tanks had leaked and to establish baseline VPH & BTEX levels prior to the property being leased. Samples were submitted to Philip Analytical Services for analysis. A detailed Phase 1 Site Assessment report was prepared for the client including photos, maps and sampling results.

- **Hodson Contaminated Site Remediation (Surrey)**
  Mr. & Mrs. Hodson

  Soil samples were collected to determine the extent of contamination from a fuel oil tank that had leaked onto the property. After soil was removed from the site, samples were again taken to determine that contaminant levels were within the Provincially accepted limits for EPH. Samples were submitted to Philip Analytical Services for analysis. A detailed Site Remediation report was prepared for the client and MELP including photos, maps and sampling results.

- **Oceanview Restaurant Phase 1 Site Assessment (Surrey)**
  4-10 Marketing & ANT L.L.C

  Soil samples were collected to determine the extent (if any) of contamination from the creosote railway ties adjacent to the property. Also, a detailed Phase 1 Contaminated Site Assessment was done for the property, including a thorough examination and assessment of the building, historic site use, etc. All contaminate levels found in the soil were within the Provincially accepted limits for PAH's. Samples were submitted to ALS Environmental for analysis. A detailed Phase 1 report was prepared for the client including photos, maps and sampling results.

Miscellaneous Projects:

- **Amphipod and Sediment Collections**
  EVS Consultants Ltd.

  Both sediment and amphipod (*Rhepoxinius abronius*) samples were collected using a benthic dredge towed behind a boat. Samples were submitted to EVS lab for use in toxicity studies.

- **Salmon Enhancement/Lake Fertilization Program**
  Dept. of Fisheries & Oceans and J.O. Thomas & Associates Ltd.

  This project was done from 1987 - 1992 and involved the field studies of sockeye salmon nursery lakes in the Fraser River system; water quality sampling, plankton collection and sample analysis, littoral fry surveys, computer collation analysis of data; operation and maintenance of DFO field camps, boats, and field instruments; synchronous culture & radiolabelling of algal cultures for field grazing experiments; time-course experiments using radiolabelled algae or fluorescent tracer particles to determine zooplankton and protozoan feeding; enumeration and identification of bacteria, phytoplankton, and zooplankton; design, construction and deployment of sediment traps and in-situ enclosures for experimental field studies of lake carbon dynamics; field enclosure and laboratory experiments including radiocarbon flux studies and nutrient/micronutrient bioassays; data collation, analyses, and report preparation; operation and maintenance of DFO boats and field instruments.

Information on many additional projects and documentation on the aforementioned projects may be viewed upon request.