Watershed: Fraser River mainstem

Watershed Code: 00-0000

Drainage Area(ha):

Habitat Management Area: Middle Fraser

Physiographic Area(s): Fraser Basin

Biogeoclimatic Zone: Bunch Grass
Interior Douglas Fir
Sub-Boreal Spruce

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	1,410.0				300	Reference for above data is WSC Stn 08MC018 - Fraser River near Marguerite. Period of record 1950-1990. Drainage area=114,000 km2. Mean monthly low flow=426 m3/s in February. (300)
				March		

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X							
Chinook	X							
Coho	X							
Pink	X							
Chum	X							
Steelhead	X							

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			301 335
- Percent Total Logging	Low		Not available for Fraser Corridor.	301
- Percent Recent Logging				301
- ECA Status	Low			
- Riparian Condition	Low		Localized impacts of private land logging.	301
Agriculture	High		High concern in the Interior and Chilcotin Plateau area. Low concern in Coastal and Cascades Mountain area.	301 335

Watershed: Fraser River mainstem

- Extent	High		Throughout upper river valley.	301
- Riparian Condition	Low		Riparian impacts in tributaries and back channel areas.	301 302
- Water Withdrawal	Low		Withdrawal in tributaries. Some intake problems such as fish entrainment.	301 302
- Water Quality			Some feedlots on tributaries, not presently assessed.	301
Urbanization	Low		Concentrated at Quesnel, smaller urban centers at Williams Lake, Hope, Lillooet, Yale, Spuzzum and Boston Bar.	301 335
- Population Level	Low		20,000 in Quesnel, 10,400 in Williams Lake	303 335
- Extent	Low			301
- Riparian Condition	Low		Localized, site specific impacts such as riprap, stream crossings, fill and debris at Quesnel.	301 304
- Water Withdrawal	Low		Industrial use, problems with intake screen entraining fish	301
- Water Quality	High		Sewage and pulp mill effluent, urban runoff, William Lake sewage and wood waste.	301 305
Recreation				
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low		Some problems with intake screens entraining fish in upper Fraser River. Low level of concern in lower Fraser River but requires more assessment to determine extent of development.	301 302 335

Watershed: Fraser River mainstem

- Extent	High		Throughout on Fraser River gravel bars.	301
- Water Quality	Low			301
- Riparian Condition	High		Access to placer mining sites and site specific concerns including impacts on seasonal back channels.	301 302
Other Mining	Low			301 335
- Extent	Low		Gibraltar Copper Mine, McLeese Lake. Localized gravel removal for construction.	301
- Water Quality	Low		Active acid leaching of waste rock dumps. Cuisson and Lewis Creek groundwater are currently monitored. Requires ongoing assessment.	301
Industrial Development	Low		Two pulp and paper mills (Cariboo Pulp and Paper and Quesnel River Pulp) in Quesnel area. Both discharge to Fraser River.	303 335
- Extent	Low		Localized, primarily in Quesnel.	301
- Water Quality	Low		Two pulp mills at Quesnel, manufacturing and service industries, sawmills, woodwaste storage. Sewage discharge at Williams Lake.	301
- Riparian Condition	Low		Site specific related to above. Restoration potential - see Special Considerations section.	301
Linear Development	High		Highways, railway right of ways and railway crossings, bridges, gas pipeline corridor, transmission line corridor, proposed east-west connector.	301 335
- Extent	High		Two railways require regular maintenance which can involve blasting and sidecasting of rock when no other alternative exists. Side casted materials may infill critical holding pools and increase migration mortality of adults.	301 335
- Riparian Condition	High		Site specific impacts including side channel alienation, loss of riparian habitat, channelization, especially on small tributaries. Potential derailment of chemicals could be detrimental to fish.	301 335
Hydro Development	Low		None.	301 335
- Extent				

Watershed: Fraser River mainstem

- Riparian Condition				
Other Development	Low		None.	301 335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low		At present, temperature/flow levels are primary factors for fish passage. Some concerns regarding industrial and urban water pollution in upper Fraser. Also concerns with railway maintenance practices affecting fish passage through the Fraser	301 335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	Glacial drift and non-glacial sediments	301 306
Terrain	High	Lower river: natural slope failures can impede migration of adult salmon. Upper river: level of concern is low as the valley is deep and narrow, lying in a flat to gently-rolling plateau. Large, dynamic river where resistance to change is low (301).	301 306 335
Hydrology	Low	Extremely variable flow regime in small tributaries may be a concern as hydraulic conditions can affect fish passage and available rearing habitat.	301 335
Channel Stability	Low	Large gravel bars, some bank and channel instability. Alluvial fans at mouth of small tributaries are often unstable.	306

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Large eroding stream banks. Side channels, non-natal tributaries and seasonally flooded areas provide overwintering habitat. The lower river lacks resting and holding pools for migrating adults and at some flows can impede migration of adults.	301 335
Sensitive Biological Features	X	Pink spawning and all species rearing in mainstem and low gradient reaches of several tributaries. Important rearing and critical migration corridor throughout.	301 335
Significant Environmental Variables	X	High suspended sediments during high flows. Access to small tributary habitat varies with mainstem flow/stage. Summer water temperature concerns in mainstem and small tributaries which can increase pre-spawn mortality of migrants.	301 306
Unique Features		Glacial waters from non salmon producing tributaries are believed to provide critical pocket of cold water holding areas for migrating adult salmon.	317 335

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery	X	Native commercial fishery by Stolo between Hope and Sawmill Creek.	329
Recreational Fishery	X	Steelhead fishery near Lillooet but closed in 1994, chinook fishery in mainstem Fraser River. Sturgeon fishery from Bridge River rapids to Hell's Gate but closed for conservation since 1994.	334 223
Native Fishery	X	Intensive Native fishery between Hope to Sawmill Creek by Stolo Nation. Less intensive Native fishery between Sawmill C to Prince George by Nlaka'pamux, Stl'atl'imx and other northern Nations. Fishery is primarily focussed on sockeye, with some chinook.	329

Restoration Activity	X	Hells Gate fishway constructed in 1946.	335
Restoration Opportunity	X	Removal of fill and debris that is encroaching on FR at Quesnel. Removal of barriers; culverts/screens at small tributaries should be investigated. Restore riparian vegetation along agricultural fields and riverfront trail system on FR near Quesnel.	302 304
Enhancement Activity			
Enhancement Opportunity	X	Establish riparian leave strips adjacent to City of Quesnel. Produce side channel rearing habitat by reinstating flow through old log channel at Weldwood Mill.	304

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	8	1	3	6

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
	Temperature data collected in Fraser River basin during summers of 1993,1994. Sampling sites selected to assess the effect of tributary input into the Fraser River and included N. & S.Thompson, Nicola, Bridge, Chilcotin, Quesnel, West Road, Nechako, Siska	317
Land and Resource Management Plan	Lillooet LRMP	
CORE Land Use Plan	Cariboo Chilcotin CORE Land Use Plan	
Inventory and Assessment	Temperature monitoring in Fraser River basin during 1993, 1994 to assess the effect of tributary input into the Fraser River. Included N. & S Thompson, Nicola, Bridge, Chilcotin, Quesnel, West Road, Nechako and Siska Creek.	338
Research	Temperature Monitoring study on mainstem Fraser River to identify cumulative stress on migrating adults and identify potential impacts on future production.Department of Environment study of fish health and contaminant levels in Fraser River basin - 1997.	317 343
Other	Fish distribution and habitat use study in progress focussing on juvenile chinook salmon.	333 339

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Identify and assess slope stability problems in the Fraser Canyon.
	Identify and map areas of difficult passage for migrating salmon through the Fraser canyon and develop strategies to avoid future blockages.
	Maintain and/or improve maintenance procedures with CP railway and particularly CN railway to minimize sidecasting of rock which can reduce adult migration survival if critical holding pools are infilled.
	Assess the value in removing barriers such as culverts and screens at the mouth of small tributaries in the upper Fraser River.
	Manage land use activities in salmon and non salmon producing tributaries to sustain riparian habitat, instream habitat, stream temperatures and the natural hydrologic regime.
	Maintain designated "no staking placer reserves" for placer mining.
	Apply FPC riparian guidelines for new placer mines.
	Follow foreshore classification recommendations for the Fraser River mainstem for land use development in the vicinity of Quesnel. Develop a similar classification and recommendations for Williams Lake, Hope and other urban centers where necessary.
	Document rearing areas in Fraser river mainstem and accessible small tributaries along the Fraser River.
	Apply land development guidelines for foreshore development as a minimum standard. (Land Development Guidelines for the Protection of Aquatic Habitat; Stream Stewardship: a Guide for Planners and Developers).
Maintain/enhance water quantity for instream uses	Develop a Water Management Plan (WMP) that includes a determination of water demand, fisheries minimum low flows, water storage opportunities and potential impacts of water extraction in small tributaries.

Maintain/enhance water quality	Assess the extent and impacts of placer mining in the lower Fraser River.
	Investigate the effects of warm water discharges from pulpmills on migrating adult and rearing juvenile salmon in the Fraser River mainstem.
	Continue water quality monitoring and the investigation of sublethal effects of single compounds and the cumulative effects of pulpmill effluent on salmon.
	Continue to monitor water temperatures during the adult migration period and identify glacial fed tributaries that provide cold water refuge areas in the mainstem Fraser River.
Maintain/enhance watershed and stream channel integrity and stability	Ensure development plans reflect the sensitivity of critical habitats in terms of hydrology, water quality and riparian conditions. Tributary temperatures are a particular concern.
Maintain/enhance fish and habitat diversity	Implement interim management strategies to assist in the recovery and research on Fraser River sturgeon species as identified in Echols 1995 (ref 345).

Watershed: Coquihalla River

Watershed Code: 00-0800 Drainage Area(ha): 93200

Habitat Management Area: Middle Fraser

Physiographic Area(s): Cascade Mountains

Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock
Engelmann Spruce-Subalpine Fir

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	30.0	234.0	6.0	7.8	307	WSC Gauge 08MF003, complete gauging records from 1957-1991

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	310	1986	76	310		Unknown	M
Coho	X	200	1965	48	100	35	Increasing	H
Pink	X	118,921	1985	30,972	118,921	4,674	Increasing	M
Chum	X	1,200	1985	413	1,200	125	Increasing	M
Steelhead	X							

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry				
- Percent Total Logging			4% of the total basin has been logged. Logging concentrated in sub-basins including Sowaqua Creek. Needs assessment at the subbasin level.	307 335 340
- Percent Recent Logging			3% of the logging has occurred within the last 10 years.	307
- ECA Status			Recent and proposed logging in the current 5 year development plan will equal an ECA of 4% for the entire Coquihalla watershed.	307
- Riparian Condition	High		Sowaqua Creek: road failures and degraded riparian habitat has been observed.	340
Agriculture	Low			335

Watershed: Coquihalla River

- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization	High		Town of Hope in lower river has encroached on and channelized the lower Coquihalla River.	335 316
- Population Level	Low		Hope: 7,118 residents.	335 336
- Extent	Low			
- Riparian Condition	High		In lower 6.4 kilometers bank protection works and encroachments have degraded riparian habitat.	335
- Water Withdrawal	Low			335
- Water Quality	Low			335
Recreation	Low			335
- Extent			Golf course located at mouth.	316
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335

Watershed: Coquihalla River

- Extent				
- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	High		Highways 3 and 5, CN railway, gas pipeline, and oil pipeline (TransMountain Pipeline), B.C. Telephone light guide lines.	335 316
- Extent	High		Highway 5 and pipeline construction has confined and diverted the river causing increased erosion and increased bedload movement which has resulted in increased flood and erosion problems in the lower river.	335
- Riparian Condition	High		Riparian areas throughout have been negatively impacted by placement of riprap.	335
Hydro Development	Low			335
- Extent				

Watershed: Coquihalla River

- Riparian Condition				
Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		High level of concern from urban development in the lower river and linear development throughout. Resource development in the upper river is believed to exacerbate flooding and erosion problems in the lower river.	335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low		335
Terrain			
Hydrology	High	Small changes to peak flows have a high impact on downstream flooding problems near Hope.Three signficant peak flows have occurred in the last 10 years, 2-50 year events and 1-25 year event.	335
Channel Stability	High	Coquihalla River has not stabilized after highway construction where diversion and erosion problems continue to occur. Some undermining has been observed under Highway 5 bridges at Alexandra and Twin creeks.	335

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Frequent flooding problems near Hope. After any significant storm event, gravel removal and bank protection measures are undertaken by Town of Hope for flood control.	335
Sensitive Biological Features	X	Salmon spawning limited to lower river downstream of Othello.	335
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Catch and release Steelhead fishery re-opened in 1996.	335
Native Fishery		None.	335

Restoration Activity	X	Instream mitigation structures for highway 5 project. Spring C: LWD and boulder channel improvements. Karen C: off channel spawning and rearing habitat restoration for steelhead.	335 340
Restoration Opportunity	X	Restore lost floodplain habitat and bedrock controlled adult holding pools that were lost as a result of highway and pipeline construction.	341
Enhancement Activity			
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	7	2	2	3

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Watershed Restoration Program	WRP Fish Habitat Restoration works in Spring Creek and Karen Creek.	337
Inventory and Assessment	WRP habitat and fisheries assessments conducted in 1996/1997for Sowaqua Creek, Silverhope Creek, Spring Creek, Karen Creek and the upper Coquihalla River watershed.	340

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Assess the impacts and degree of forest development at the sub-basin level through the application of the Watershed Assessment Procedure.
	Restrict further linear development to minimize negative impacts of linear development on fisheries values in the Coquihalla River valley.
	Prevent further encroachment and channelization by developing an all encompassing flood hazard management plan for the lower river adjacent to Hope rather than site by site prevention as occurs presently.
	Implement the application of the Land Development Guidelines for urban development within the District of Hope.
Restore and enhance habitat	Mitigative activities in the mainstem Coquihalla should priorize sites where floodplain habitat and bedrock controlled adult holding pools can be restored.
	Minimize continual impacts of linear development on fish habitat and permanent loss of riparian function by hiring a coordinator to oversee repair, maintenance and resource development associated with forestry, highways and oil/gas pipeline companies.
	The Coquihalla watershed has been identified by DFO and MELP as a high priority area for a review of the current state of the watershed and the cumulative impacts of resource development activities on fisheries resources.

Watershed: Kawkawa Creek

Watershed Code: 00-0800-010 Drainage Area(ha): 900

Habitat Management Area: Middle Fraser

Physiographic Area(s): Cascade Mountains Biogeoclimatic Zone: Coastal Western Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	0.3		0.2	0.4	307	No gauge on Kawkawa Creek. Incomplete records for Kopp Creek WSC gauge No 08MF032 (1982-85 MC).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	2,172	1987	457	1,897		Unknown	M
Coho	X	2,391	1970	182	591		Unknown	M
Pink	X	6,175	1985	1,318	6,175		Unknown	M
Chum	X	2,750	1985	994	2,750		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			335
- Percent Total Logging	Low		No logging has occurred to date.	307
- Percent Recent Logging				
- ECA Status				
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: Kawkawa Creek

- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization				
- Population Level			Trailer park on Kawkawa Creek, town of Hope, cottages on lakeshore and tributaries upstream of lake.	316
- Extent	High		Alteration to stream channel by channelization, flood control works and inadequate sized culverts that are creating migration barriers. Increasing urban development.	342 335
- Riparian Condition	High		Cottages along lakeshore, removal of natural riparian vegetation throughout.	342
- Water Withdrawal			Water withdrawals from Kopp Creek amount to 2% of typical low flows. Groundwater development in the watershed would further reduce typical low flows.	307
- Water Quality	High		Residential development creates the main impact on water quality and quantity in Kawkawa Lake and tributaries.	307
Recreation			Needs to be assessed.	335
- Extent			Provincial park on south shore of Kawkawa Lake. Cottages on lakeshore.	316 335
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent				

Watershed: Kawkawa Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Oil pipeline within .5 kilometers of southern shore of Kawkawa Lake.	316 335
- Extent				
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Watershed: Kawkawa Creek

Other Development	Low		Sawmill near Kawkawa Creek.	316
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology			
Channel Stability			

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Groundwater fed tributaries upstream of Kawkawa lake provide valuable rearing habitat. Flooding and erosion occur along some of the channels, primarily as a result of insufficient channel capacity.	335 307
Significant Environmental Variables			
Unique Features	X	Adjacent swamp area to the north is extensive.	335

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery			
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity	X	1984: spawning gravel placement. 1987: chinook spawning channel constructed below lake. Selective coarse fish barrier constructed downstream of lake outlet.	316
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	3	0	2	1

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Apply the DFO/MELP Land Development Guidelines as a minimum standard for future urban development.
	Evaluate the current impacts of urban growth and recreational development on fish and fish habitat through a fish habitat assessment.
Maintain/enhance water quantity for instream uses	Further study of low flows in the tributaries upstream of Kawkawa Lake is needed, particularly the proportion of groundwater contribution. Further licensing of these streams should be opposed until the system has been studied in more detail.
	Determine the impacts of urban development and erosion problems on fish habitat in Menz Creek and implement mitigation measures if necessary.

Watershed: American Creek

Watershed Code: 00-0815

Drainage Area(ha): 3200

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges

Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	3.1	4,902.0	0.2	0.1	307	WSC gauge 08MF032 (1933-36 + 1940 M#).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Coho	X	25	1968	3	15		Unknown	H
Pink	X	4,412	1985	770	4,412	48	Increasing	M
Chum	X	120	1985	36	120		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			307
- Percent Total Logging			6% of the total basin has been logged.	307
- Percent Recent Logging			6% of the logging has occurred within the last 10 years.	307
- ECA Status			Recent and proposed logging in the current 5 year development plan will equal an ECA of 9%.	307
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: American Creek

- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization	Low		Native Reserve located at mouth.	316 335
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation	Low			335
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent			During the 1960's a placer mine was operating at the confluence of the Fraser River which shut down by 1986.	316

Watershed: American Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Highway 1, power transmission lines and CP railway cross lower river. Periodic maintence work required on highway and railway.	335 316
- Extent				
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Watershed: American Creek

Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	The system has little ability to resist water removal due to low summer (7%) and winter (4%) 7 day low flows. Streamflows are flashy with the potential for scour and erosion.	307
Channel Stability			

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features		Salmon spawning habitat limited to few hundred meters downstream of railway bridge.	335
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery			
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity		Limited spawning potential as the streambed consists of large boulders.	316

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	0	0	0	0

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Apply the Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Emory Creek

Watershed Code: 00-0841 Drainage Area(ha): 6500

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	5.1	68.6	0.4	0.4	307	WSC gauge 08MF030 (1933-36 MC).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	25		5	25		Unknown	M
Pink	X	1,539		444	1,539		Unknown	M
Chum	X	50	1985	17	50		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			307
- Percent Total Logging			7% of the total basin has been logged.	307
- Percent Recent Logging			6% of the logging has occurred within the last 10 years.	307
- ECA Status			Recent and proposed logging in the current 5 year development plan will equal an ECA of 7%	307
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: Emory Creek

- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization	Low			335
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation	Low			335
- Extent			Emory Creek provincial park located at confluence with Fraser River.	316
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent				

Watershed: Emory Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Highway 1, railway and power transmission lines cross the lower river adjacent to salmon spawning habitat. Periodic maintenance required to highway and railway.	335
- Extent			Highway 1, CP railway and power transmission lines cross lower river.	316
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Watershed: Emory Creek

Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	The system has little ability to resist water removal due to low summer (7%) 7 day low flows.	307
Channel Stability			

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	The only low gradient salmon spawning reach is located downstream of the railway bridge.	335
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Sport fishery for salmon at the mouth.	316
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	0	0	1	1

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
Maintain/enhance water quantity for instream uses	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Gordon Creek

Watershed Code: 00-0855 Drainage Area(ha): 1100

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	0.8	16.0	0.1	0.1	307	

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Coho	X	20		5	20		Unknown	M
Pink	X	30	1985	10	30		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			307
- Percent Total Logging	High		22% of total basin has been logged.	307
- Percent Recent Logging			22% of total logging has occurred within the last 10 years.	307
- ECA Status	High		Recent and proposed logging in the current 5 year development plan equals 22%.	307
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: Gordon Creek

- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization	Low			335
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation	Low			335
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent				

Watershed: Gordon Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Highway 1, CP railway and power transmission lines cross lower river adjacent to salmon spawning habitat. Periodic maintenance required on railway and highway crossings.	335 316
- Extent				
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Watershed: Gordon Creek

Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		Forestry development	307

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	The system has little ability to resist water removal due to low summer (7%) 7 day low flows. Streamflows are flashy with the potential for scour and erosion.	307
Channel Stability	Low	Bank erosion observed downstream of CPR crossing.	335

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Pink and coho spawning limited to lower river below railway bridge.	316
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery			
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity		Steep gradient with limited spawning gravels in lower river. Impassable structure above CPR/highway crossing.	335

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	3	0	1	0

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	The hydrologic impacts of forest harvesting should be assessed through the application of the Coastal Watershed Assessment Procedure.
	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
Maintain/enhance water quantity for instream uses	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Yale Creek

Watershed Code: 00-0860 Drainage Area(ha): 3700

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	2.4	49.2	0.1	0.2	307	WSC gauge 08MF031 (1933-1936 MC).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	104		26	104		Unknown	M
Coho	X	25	1965				Unknown	
Pink	X	1,734	1985	291	1,734	18	Increasing	M
Chum	X	100	1985	33	100		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			307
- Percent Total Logging			5% of the total basin has been logged.	307
- Percent Recent Logging			5% of logging has been within last 10 years.	307
- ECA Status			Recent and proposed logging in current forest development plan will equal an ECA of 5%.	307
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: Yale Creek

- Riparian Condition				
- Water Withdrawal	Low		Minor withdrawals for irrigation and waterworks (3% of Aug 7 day summer low flow).	307
- Water Quality				
Urbanization	Low		Town of Yale and Yaletown IR at mouth.	335 316
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal	Low		Minor withdrawals for irrigation and waterworks (3% of Aug 7 day summer low flow).	335
- Water Quality				
Recreation	Low			335
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent				

Watershed: Yale Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Highway 1, CP railway and power transmission lines cross lower river. Periodic maintenance required on highway and railway.	316 335
- Extent				
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Watershed: Yale Creek

Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	The system has little ability to resist water removal due to low summer (5%) and winter (7%) 7 day low flows. Streamflows are flashy with the potential for scour and erosion.	307
Channel Stability			

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Salmon spawning habitat limited to few hundred meters downstream of railway bridge.	335
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery			
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity		Very limited spawning area, turbulent stream filled with boulders.	316

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	0	0	1	0

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.
	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
Maintain/enhance water quantity for instream uses	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Spuzzum Creek

Watershed Code: 00-0900 Drainage Area(ha): 22400

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges Biogeoclimatic Zone: Coastal Western Hemlock
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	14.5	206.3	0.8	1.0	307	

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	48		8	48		Unknown	M
Coho	X	75	1968			10	Unknown	
Pink	X	10,496	1985	1,936	10,496	17	Increasing	M
Chum	X	110	1985	31	110		Unknown	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low		Logging has occurred since 1971.	335 316 307
- Percent Total Logging			7% total basin.	307
- Percent Recent Logging			4% recent basin (within last 10 years).	307
- ECA Status			6% recent and proposed in current forest development plan.	307
- Riparian Condition				
Agriculture	Low			335
- Extent				

Watershed: Spuzzum Creek

- Riparian Condition				
- Water Withdrawal			Minor water withdrawals for irrigation (54 ac-ft) that do not affect low flows.	307
- Water Quality				
Urbanization	Low		Spuzzum IR at mouth.	316
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal			Minor water withdrawals for waterworks (47,000 g/day) and domestic use (500 g/day that do not affect low flows.	307
- Water Quality				
Recreation	Low			335
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335
- Extent				

Watershed: Spuzzum Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development	Low			335
- Extent				
- Water Quality			Industrial water licence for 17,000 g/day	307
- Riparian Condition				
Linear Development	Low		Highway 1, CP railway and power transmission lines cross lower river. Transmission station at mouth. Periodic maintenance required on highway and railway.	335 316
- Extent				
- Riparian Condition				
Hydro Development	Low			335
- Extent				
- Riparian Condition				

Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	The system has little ability to resist water removal due to low summer (5%) and winter (7%) 7 day low flows. Streamflows are flashy with the potential for scour and erosion.	307
Channel Stability	Low	Bed material is large, flooding and bank erosion are common.	307

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Scattered spawning between the mouth and CP Railway bridge.	307
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Sport fishery in pool at confluence with Fraser River.	316
Native Fishery			

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity		Limited spawning habitat due to boulders, flooding and erosion.	316

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	0	0	1	1

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
Maintain/enhance water quantity for instream uses	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Anderson River

Watershed Code: 00-1000 Drainage Area(ha): 50000

Habitat Management Area: Middle Fraser

Physiographic Area(s): Cascade Mountains

Biogeoclimatic Zone: Coastal Western Hemlock
Interior Douglas Fir
Engelmann Spruce-Subalpine Fir
Mountain Hemlock

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	10.2	91.1	0.9	0.6	307	WSC gauge 08MF001 (1945-50 + 1981-83 RS).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Coho	X	40		8	40	6	Increasing	M
Pink	X	1,895	1985	442	1,895	127	Increasing	M
Chum	X	150	1984	41	150		Unknown	M
Steelhead	X							

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	High		Extensive logging in tributary valleys. J.S. Jones is major licensee, MOFs Small Business Forest Enterpise Program harvest a few blocks.	335 316 318
- Percent Total Logging			15% total basin. By 1997, much of the watershed would be more than 20% logged though regeneraltion would reduce the ECA value.	307
- Percent Recent Logging			12% recent basin (<10 years old).	307
- ECA Status	High		20% recent and proposed to 1997. MELP identified rate of cut concerns. 25% immediate reduction in AAC will be implemented in 1996. Future harvesting will be limited by spotted owl special resource management zone and deer winter range requirements.	307 318
- Riparian Condition	High		In many reaches, cutblocks extend to the margins of the channel and riparian vegetation has been removed.	307
Agriculture	Low			335

- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Urbanization	Low			335
- Population Level				
- Extent			Tuckkwiowhum IR located on the south shore of the lowermost 1 kilometer of the Anderson River.	332
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation	Low			335
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			335

Watershed: Anderson River

- Extent				
- Water Quality				
- Riparian Condition				
Other Mining	Low			335
- Extent				
- Water Quality				
Industrial Development				
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Highway 1 and CN railways crosses lowermost 1 kilometer.	332 335
- Extent			CNR concrete apron created a hydraulic barrier to salmon migration at some flow levels. Cement apron was removed and natural stream bottom restored in 1992, improving access for migrating adults.	335
- Riparian Condition				
Hydro Development	Low			335
- Extent				

Watershed: Anderson River

- Riparian Condition				
Other Development	Low			335
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	H		Forest development.	335

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	No concerns at this time.	318 335
Terrain	Low	No concerns at this time. Flood in December 1980 caused landslides and road failures.	318 307
Hydrology	High	Needs assessment through a Coastal Watershed Assessment Procedure.The system has little ability to resist water removal due to low winter (5%) 7 day low flows.	318 307
Channel Stability	Low	Removal of vegetation in the middle portion of the Anderson River has resulted in channel erosion.	307

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Entire pink spawning and juvenile rearing habitiat is located within the Fraser River floodplain which is unstable and shifts constantly during fall floods when the Fraser River is low.	316 307
Significant Environmental Variables	X	The Fraser River floods the fan during freshet and deposits fine sediment and sand. Heavy silt accumulates at the mouth from Fraser River.	316 307
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery			
Native Fishery			

Restoration Activity	X	Upstream passage of adults was improved during railway bridge maintenance work which replaced a concrete apron with a natural stream bottom.	335
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	4	1	2	1

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Land and Resource Management Plan	Lillooet LRMP	
Lanscape Unit Planning	Anderson watershed is included in MELP/MOF Landscape Unit planning process.	318

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Determine whether the log jams in the lower 3-4 kilometers of the Anderson River are creating fish passage problems and facilitate passage if necessary.
Maintain/enhance watershed and stream channel integrity and stability	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
	MELP and DFO recommends a Coastal Watershed Assessment Procedure to assess current hydrological condition of the Anderson watershed at the sub-basin level.

Watershed: Nahatlatch River

Watershed Code: 00-1200 Drainage Area(ha): 125600

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges

Biogeoclimatic Zone: Interior Douglas Fir
Engelmann Spruce-Subalpine Fir
Coastal Western Hemlock
Mountain Hemlock
Alpine Tundra

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	38.0	229.9	12.6	7.6	307	WSC gauges 08MF007, 008, 065. (1912-21 M#, 1912-21 MC, 1973-91 RC respectively).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	16,606	1988	5,465	16,606	839	Increasing	M
Chinook	X	400	1955	69	240	63	Static	H
Coho	X	15,000	1962	527	1,565	410	Increasing	H
Pink	X	35,100	1991	5,516	35,100	430	Increasing	M
Steelhead	X							

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry			Approximately 21% of the total landbase is operable. Upper Nahatlatch logged by Cattermole Timber, Log Creek by J.S.Jones, Kookipi Creek by MOFs SBFEP, and Teapot Creek is under tenure to Interfor.	322 320
- Percent Total Logging	Low	2% total basin	Proposed to 1998 equals 3% of total basin area. Log Creek equals 6% total basin logged, Upper Nahatlatch will equal 4% logged by 1998. Mehatl Creek is currently unlogged (1996) but forestry development is imminent. First pass has been removed	307
- Percent Recent Logging	High	2% total basin	Increasing rate of cut with logging concentrated in sub-basins. Most of recent logging concentrated in upper Nahatlatch, Log C and Kookipi C. Log C has >30% of CWH biogeoclimatic zone removed.	319
- ECA Status			Low ECA overall but harvest of operable timber is concentrated in Log Creek, Kookipi Creek and upper Nahatlatch River in rain-on-snow zones and therefore has the potential to affect peak flows.	
- Riparian Condition	High		Significant loss of riparian vegetation on mainstem adjacent to major spawning habitat, as well Log Creek, Kookipi Creek and upper Nahatlatch tributaries. In upper watershed: extensive rip rapping, road constructed in side channel and bridge	327

Watershed: Nahatlatch River

Agriculture	Low			319
- Extent				
- Riparian Condition				
- Water Withdrawal	Low		Irrigation water license: 6 ac-ft in lower river. Insignificant licensed demand.	307
- Water Quality				
Urbanization	Low			319
- Population Level				
- Extent	Low		23 summer homesites located along the lakes, rafting operation has permanent campsite at 14.5 kilometers.	321
- Riparian Condition				
- Water Withdrawal	Low		Domestic water licenses: 6,550 g/day in lower river. Insignificant licensed demand.	307
- Water Quality				
Recreation	Low		Extremely high recreation values in lower river from Nahatlatch Lake to the Fraser River. Commercial rafting operations, hiking, hunting, fishing, kayaking and rafting.	218 220
- Extent	Low		Nine forest service recreation sites. 1992 site user days exceeded 15,000 days which equals a 400% increase since 1985. Mehatl drainage designated as a park in 1996.	218
- Riparian Condition				
- Water Quality				

Watershed: Nahatlatch River

Placer Mining	Low			319
- Extent				
- Water Quality				
- Riparian Condition				
Other Mining	Low		Mineral resource potential occurs within a north/south belt along the east side of the drainage. Currently two mining companies exploring potential for talc and magnetite (Pacific Talc and Highland Talc)	220
- Extent				
- Water Quality				
Industrial Development	Low			319
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Power transmission lines cross lower river.	319 332
- Extent			Logging roads throughout most of watershed except for Mehatl Creek and Teapot Creek.	319
- Riparian Condition				
Hydro Development	Low			319

Watershed: Nahatlatch River

- Extent				
- Riparian Condition				
Other Development	Low			319
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		Forestry development.	

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain	High	More than half of the terrain polygons in the operable area within the Mehatl are unstable or potentially unstable: harvesting may cause increase in coarse sediment supply to Nahatlatch mainstem.	327
Hydrology	Low	Limited operability (20%) has concentrated harvesting in low elevation areas within the rain on snow zone. Hydrologic impacts in Log Creek need to be examined. First pass in upper watershed is occuring over a short time frame	327
Channel Stability	High	Mainstem reasonably stable, with least stable reach upstream of Mehatl confluence. Lateral channel stability is moderately sensitive to floodplain logging.	327

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Small sensitive runs of chinook salmon and steelhead. Major spawning/rearing habitat for chinook, coho and sockeye between Mehatl confluence and Nahatlatch Lake on floodplain area	319
Significant Environmental Variables			
Unique Features	X	Mehatl Creek watershed established as a park in 1996 as part of the Protected Area Strategy Process.	

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Catch and release fishery for chinook and coho. Catch and release steelhead fishery in the spring, rainbow trout and bull trout fishery in lakes.	319 323
Native Fishery	X	No current Native fishery in the Nahatlatch River. Small sockeye and chinook fishery in the Fraser River near the mouth of the Nahatlatch by the Boothroyd Band.	329 319

Restoration Activity			
Restoration Opportunity	X	Road de-activation, stream cleaning and riparian restoration in Log Creek, Kookipi Creek and upper Nahatlatch tributaries. Riparian restoration along floodplain reaches to reduce bank erosion and stability problems. See ref 327 for more restoration opp	319 327
Enhancement Activity	X	1977:Side channel constructed around log jam at 43 km. 1995 natural rock slide in spring near REO's Rafting camp in canyon that caused a velocity barrier to returning sockeye and chinook adults. DFO SEP blasted the impass during the winter of 95/96.	325 319
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	3	2	2	4

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Local Resource Use Plan	Nahatlatch Integrated Resource Management Plan	319
Total Resource Plan	Mehatl Total Resource Plan	319
Lanscape Unit Planning	MELP/MOF Landscape Unit Planning Process	318
Demonstration Watershed	Fraser Basin Management Program: Demonstration Watershed	319
Watershed Assessment Procedure	Coastal Watershed Assessment Procedures being conducted by the Boothroyd Band and funded by Watershed Restoration Program. MELP priorized CWAP on Kookipi Creek.	319 318
Watershed Restoration Program	Minor road de-activation and debris removal from streams in Log Creek by J.S. Jones.	324
Riparian Corridor Management Plan	DFO and MELP jointly developed the Nahatlatch Riparian Management Plan for the mainstem and major tributaries	319

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Restore and enhance habitat	DFO considers this watershed a high priority area for watershed assessment through the application of the Coastal Watershed Assessment Procedure. Complete restoration prescriptions as recommmended by reference 327.
Maintain/enhance fish and habitat diversity	Forest development guidelines outlined in the Nahatlatch Riparian Management Plan should be implemented by MOF in order to assist in the protection of fish and fish habitat from resource development activities.
	Implementation of Integrated Resource Management Plan and Riparian Management Plan will assist in protecting fish and fish habitat. Active participation in Total Resource Plans will assist protection of fish habitat at the operational planning level.
Rebuild and enhance salmon stocks	Determine current utilization by salmon species by implementing more comprehensive adult and juvenile enumeration methods.

Watershed: Kwoiek River

Watershed Code: 00-1277

Drainage Area(ha): 0

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges

Biogeoclimatic Zone: Interior Douglas Fir
Coastal Western Hemlock
Montane Spruce
Engelmann Spruce-Subalpine Fir
Alpine Tundra

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)					326	Streamflow characteristics unavailable at this time. Discharge measured on Oct 24, 1995 at 3.08 m3/sec.

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	High		Extensively logged over a short period of time.	319
- Percent Total Logging				
- Percent Recent Logging				
- ECA Status				
- Riparian Condition	High		Riparian habitat degraded from forest harvesting activities.	319 326
Agriculture	Low			
- Extent				
- Riparian Condition				

Watershed: Kwoiek River

- Water Withdrawal				
- Water Quality				
Urbanization	Low			
- Extent				
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation	Low		Popular area for fishing and hunting. Good potential to develop outdoor recreation opportunities as scenery is spectacular, glaciers, falls, cascades, hiking trails etc.	319
- Extent			Excellent trail constructed into Kokwaskey and Chochiwas Lakes by MOF passing through diverse old growth forest. This area is a high value recreational corridor. High scenic and ecological values downstream of Stukolait Lake.	326
- Riparian Condition				
- Water Quality				
Placer Mining	Low			
- Extent				
- Water Quality				
- Riparian Condition				

Watershed: Kwoiek River

Other Mining	Low			
- Extent				
- Water Quality				
Industrial Development	Low			
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Network of logging roads throughout watershed and CP railway crosses lower river.	319 332
- Extent				
- Riparian Condition				
Hydro Development			Proposal for independent power facility pending in lower river below Kwoiek Lake.	319
- Extent				
- Riparian Condition				
Other Development	Low			
- Extent				

Watershed: Kwoiek River

- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		Forestry development.	

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	Most portions of Kwoiek Creek and lakes were milky suggesting suspension/transport of clays throughout system.	326
Terrain	Low	Oct 1995: isolated slide in steep headwater area of small unnamed stream entering from the south approximately 1 km u/s of Kwoiek Lake originating in logged area, resulted in sedimentation of Kwoiek Creek into critical Bull Trout spawning habitat.	326
Hydrology			
Channel Stability			

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Logging the remaining steeper terrain may increase the likelihood of further slides and increase siltation thereby having negative impacts to fisheries values.	326
Sensitive Biological Features	X	Critical Bull Trout spawning habitat from Kwoiek Lake upstream for approximately 3 km. Coho rearing in sidechannel near mouth.	326
Significant Environmental Variables			
Unique Features	X	Mouth of the river provides one of the best Native fishing sites for sockeye.	319

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Rainbow trout and bull trout fishery. Good angling opportunities for rainbow trout in John George, Klept, Kha and Kwoiek Lake.	323 326
Native Fishery	X	One of the most productive fishing sites in the middle Fraser River at the mouth. Very high use by local Bands.	323

Restoration Activity	X	Watershed Restoration Project: Joint Nlaka'pamux Tribal Council/J.S. Jones rehabilitation assessment and prescription for 4 drainages including the Kwoiek.	330
Restoration Opportunity	X	De-activate old roads. Control siltation from slide in small drainage on south side 1 km u/s of Kwoiek Lake. Remove old bridge over Kwoiek 1 km u/s of Kha Lake; debris plug on Kwoiek u/s of Kokwaskey Lake; log complexing 1st falls u/s of Kwoiek Lake.	319 326
Enhancement Activity			
Enhancement Opportunity	X	Remove debris plug upstream of Kokwaskey Lake inlet to improve spawning opportunities for rainbow trout in lake.	326

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	3	0	3	5

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Land and Resource Management Plan	Lillooet LRMP initiated during 1995.	

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Sportfishery for bull trout in Kwoiek Lake should be catch and release fishery for conservation purposes.
Restore and enhance habitat	Remove large debris plug on Kwoiek Creek immediately upstream of its inlet to Kokwaskey Lake to improve spawning opportunities for rainbow trout in this lake. Remaining debris in Kwoiek Creek is provided good cover and should not be removed.
	Old bridge upstream of Kwoiek Creek located 1 m upstream of Kha Lake is slumped in middle and should be removed. Removal of large logs complexing first falls upstream of Kwoiek Lake may improve passage for bull trout.
	Control siltation from slide area and roads in small tributary upstream of Kwoiek Lake.
Maintain/enhance watershed and stream channel integrity and stability	Assess the hydrologic state of the watershed by applying the Watershed Assessment Procedure prior to further logging.

Watershed: Stein River

Watershed Code: 00-1400 Drainage Area(ha): 108400

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges

Biogeoclimatic Zone: Ponderosa Pine
Interior Douglas Fir
Montane Spruce
Engelmann Spruce-Subalpine Fir
Coastal Western Hemlock
Alpine Tundra

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	17.5	76.5	5.2	3.8	307	WSC gauge 08MF011. (1911-13 MS +1945 #).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X						Present	
Chinook	X	25	1980			9	Unk	
Coho	X	105	1989	29	105	3		M
Pink	X	4,243	1981	572	4,243	219	Increasing	M
Steelhead	X						Present	

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low		Undeveloped watershed.	
- Percent Total Logging				
- Percent Recent Logging				
- ECA Status				
- Riparian Condition				

Watershed: Stein River

Agriculture	Low		Undeveloped watershed.	
- Extent				
- Riparian Condition				
- Water Withdrawal	Low		Irrigation water licenses: 886 ac-ft. Insignificant licensed use.	307
- Water Quality				
Urbanization	Low		A few houses near confluence with Fraser River.	
- Population Level				
- Extent			Lytton IR in lowest 1 kilometer.	332
- Riparian Condition				
- Water Withdrawal	Low		Domestic water licenses: 3000 g/day. Lillooet removes water for domestic water supply and irrigation. Waterworks water license: 175000 g/day. Insignificant licensed use.	307
- Water Quality				
Recreation	Low		Watershed has park status and is characterized by extremely high recreation values	
- Extent	Low		Popular hiking trail from lower Stein River to upper Blowdown Creek or to upper Van Horlick Creek.	328
- Riparian Condition				
- Water Quality				

Watershed: Stein River

Placer Mining	Low		None	
- Extent				
- Water Quality				
- Riparian Condition				
Other Mining	Low		None	
- Extent				
- Water Quality				
Industrial Development	Low		None.	
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low		Gravel road crosses lower Stein near Fraser River confluence.	328
- Extent			Power transmission lines in lower 2 kilometers of the river.	332
- Riparian Condition				
Hydro Development	Low		None.	

Watershed: Stein River

- Extent				
- Riparian Condition				
Other Development	Low			
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low		Undeveloped watershed.	

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils			
Terrain			
Hydrology	Low	Undeveloped watershed.	
Channel Stability	Low	Braided, meandering sections downstream of Cottonwood Creek.	319

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features	X	Small run of genetically unique chinook salmon. Probably a small steelhead run as well.	319
Significant Environmental Variables			
Unique Features	X	One of the few remaining salmon bearing watersheds that is protected from extractive resource development activities.	319

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management	X	Proposed Enumeration Program, counting fence.	319
Commercial Fishery			
Recreational Fishery	X	Rainbow trout fishery in upper Stein lakes. Catch and release steelhead fishery in Stein River during the spring.	323
Native Fishery	X	Native food fishery by angling for chinook at the mouth. Stryen IR. High spiritual values for First Nations people.	319

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	0	0	2	3

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Other	Lower and middle Stein designated as a Protected Area in 1995. Entire watershed is now managed as a park.	

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	MELP, Water Management Branch suggests that installing a WSC gauge would provide valuable information on the natural hydrologic regime for this region.
	This system can be used to provide baseline information or be used as a "control" for an undisturbed salmon producing system for future research in determining the impacts of resource development activities on the fisheries resource.

Watershed: Texas Creek

Watershed Code: 00-1600 Drainage Area(ha): 17100

Habitat Management Area: Middle Fraser

Physiographic Area(s): Pacific Ranges

Biogeoclimatic Zone: Ponderosa Pine
Interior Douglas Fir
Montane Spruce
Engelmann Spruce-Subalpine Fir
Alpine Tundra

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	2.8	17.5	0.8	0.6	307	WCS gauge 08MF015. (1913-1921 MS).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Pink		50	0	20	50	0	Unknown	Med

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry				
- Percent Total Logging	Low		Extensive logging in south forks, some logging in Molybdenite Creek in north fork as well.	319
- Percent Recent Logging				
- ECA Status				
- Riparian Condition	Low			319
Agriculture	Low		Alfalfa, corn and ginseng grown on benches in lower reaches.	319
- Extent				

Watershed: Texas Creek

- Riparian Condition	Low		Some impacts to riparian areas from agricultural activities in upper elevational areas of the north fork.	319
- Water Withdrawal	High		Irrigation water licenses: 805 gal/day. Total surface water use demands equal 14% of minimum summer flows during August.	307
- Water Quality				
Urbanization	Low			
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal	High		Domestic water licenses: 2000 gal/day. Total surface water use demands equal 14% of min summer flows during August.	307
- Water Quality				
Recreation	Low		Hiking trail joining upper Texas Creek to the Stein River. Two recreation sites located in lower Texas Creek.	328
- Extent	Low			
- Riparian Condition				
- Water Quality				
Placer Mining	Low			
- Extent				

- Water Quality				
- Riparian Condition				
Other Mining	Low		Jade and gold mining in the north fork.	319
- Extent				
- Water Quality				
Industrial Development	Low			
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development			Logging roads throughout watershed.	332
- Extent				
- Riparian Condition				
Hydro Development	Low			
- Extent				
- Riparian Condition				

Watershed: Texas Creek

Other Development	Low			
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low		319
Terrain	Low		319
Hydrology	Low		319
Channel Stability	Low		319

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features			
Sensitive Biological Features			
Significant Environmental Variables			
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery			
Recreational Fishery	X	Likely rainbow trout sport fishery.	323
Native Fishery			

Restoration Activity			
Restoration Opportunity	X	Logging road de-activation.	319
Enhancement Activity	X	1984: coho, chinook and steelhead hatchery constructed and operated by Lillooet Rod and Gun Club, 1991 capacity of 100,000, outplants usually released into Yalakom.	331
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	2	0	0	3

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Land and Resource Management Plan	Lillooet LRMP initiated during the fall of 1995.	319

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Assess impacts of current water demands on fisheries values and develop strategies if required.
	Apply Forest Practices Code and Land Development Guidelines to minimize the impacts of resource development on salmon habitat in d/s tributary reaches and in the Fraser River mainstem.
Maintain/enhance water quantity for instream uses	Assess instream flow needs and regularly monitor withdrawals to establish the demand, actual and licensed withdrawals. Low flow agreements or restrictive licensing may be needed to maintain instream flows necessary for salmon production.

Watershed: Churn Creek

Watershed Code: 00-2900 Drainage Area(ha): 99200

Habitat Management Area: Middle Fraser

Physiographic Area(s): Fraser Plateau
Chilcotin Ranges

Biogeoclimatic Zone: Bunch Grass
Interior Douglas Fir
Sub-Boreal Pine-Spruce

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	6.0	33.3	2.9	1.6	307	WSC gauge 08MD012. (1928-1930 MS).

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X	113		13	113			M
Chinook	X	250	1985	50	250			M
Pink	X	2,366	1989	858	2,366	320	Increasing	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low		Future logging plans a concern; harvesting on unstable soils, LRUP underway.	301 302 307
- Percent Total Logging	Low		2.8% of basin logged to 1991 (0% recent), 10.2% proposed (1992-1997).	307
- Percent Recent Logging				
- ECA Status	Low			301
- Riparian Condition			Not assessed	301
Agriculture	Low		Ranching - open range land, no winter feeding out.	301 302 307
- Extent	Low		Concentrated in lower reaches.	301

Watershed: Churn Creek

- Riparian Condition			Not assessed.	301
- Water Withdrawal	Low		Water demand low but Gang Ranch holds several licences in the upper reaches. Total irrigation licences equal 287 ac-ft.	307
- Water Quality			Not assessed.	301
Urbanization	Low			301
- Population Level				
- Extent				
- Riparian Condition				
- Water Withdrawal			Domestic water licence for 18,500 g/day	307
- Water Quality				
Recreation				
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			301
- Extent	Low		Some activity in lower third.	301

Watershed: Churn Creek

- Water Quality	High		Occasional pronounced turbidity - investigation of sources required.	302
- Riparian Condition			Not assessed.	301
Other Mining	Low		Black Dome Mine (on Fairless Creek in the upper watershed) may be re-opened.	307
- Extent	Low			301
- Water Quality	Low		Concern regarding water quality and stability of Black Dome Mine tailing ponds in Fairless Creek.	307
Industrial Development	Low			301
- Extent				
- Water Quality				
- Riparian Condition				
Linear Development	Low			301 307
- Extent	Low		Logging roads and bridges throughout.	301
- Riparian Condition	Low		Concerns regarding road failures into creek.	301
Hydro Development	Low			301
- Extent				
- Riparian Condition				

Watershed: Churn Creek

Other Development	Low			301
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			301

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	High	Valley walls unstable in lower reaches, contributes lacustrine sediments to creek especially during spring freshet and fall rains. Soil type includes thick accumulations of glacial drift.	307
Terrain	Low	Flat to gently rolling plateau, low relief basin.	301 307
Hydrology	High	Subject to flash flooding.	313
Channel Stability	High	Unstable in lower reaches.	313

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Erodible cut banks in lower reaches. Natural erosion over 90% of the stream.	302 313 325
Sensitive Biological Features	X	Pink spawning at mouth.	301
Significant Environmental Variables	X	Fines originating from lacustrine sediments introduced into creek during spring freshets.	307
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery		Ocean fishery.	
Recreational Fishery		Ocean sport fishery.	
Native Fishery		Fraser River fishery.	

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity	X	Not assessed. May be potential for improving access to upper spawning and rearing areas.	301 302

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	1	3	3	1

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Local Resource Use Plan	Local Resource Use Plan for Churn Creek under preparation by MOF. Hungry Valley located in headwaters of West Churn Creek is also developing a LRUP.	301 313 314
CORE Land Use Plan	Cariboo-Chilcotin Land Use Plan - Churn Creek Protected Area - 36,600 ha.	315

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Develop a Water Management Plan that includes a determination of water demand, fisheries maintenance flows, water storage opportunities and potential impacts of water extraction.
	Develop and implement a detailed riparian management plan for the Churn Creek watershed identifying areas requiring site specific prescriptions for agricultural activities.
	Assess the impacts of ranching and forestry development on riparian habitat and water quality.
Restore and enhance habitat	Identify opportunities for fish habitat restoration and/or enhancement.
Maintain/enhance watershed and stream channel integrity and stability	Assess the extent of forest development to 1997 on a sub-basin level through the application of the Interior Watershed Assessment Procedure to determine whether the accelerated rate of cut may impact salmon values.
	Conduct an overview reconnaissance to identify potential sources of stream sediments and determine if a detailed stream channel stability assessment is required.

Watershed: Williams Lake River

Watershed Code: 00-3900 Drainage Area(ha): 224000

Habitat Management Area: Middle Fraser

Physiographic Area(s): Fraser Basin
Fraser Plateau

Biogeoclimatic Zone: Interior Douglas Fir
Sub-Boreal Pine-Spruce

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	2.6	7.3	1.4	0.4	307	WSC gauge 08MC005, (1968-1972 MS + 1973-1991 RC).
			Oct	Jan		

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Sockeye	X						Unk	
Coho	X						Unk	
Pink	X						Unk	

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low		Large lakes (Lac la Hache and Williams Lake) buffer forestry impacts, particularly sedimentation problems.	302
- Percent Total Logging	Low		12.2% of basin logged to 1991 (.4% recent), 4% proposed (1992-1997).	301 307
- Percent Recent Logging				
- ECA Status	Low			301
- Riparian Condition			Not assessed.	301
Agriculture	High			301
- Extent	High		Throughout from upstream of Williams Lake.	301

Watershed: Williams Lake River

- Riparian Condition	High		Significant impacts above Williams Lake in the San Jose River (tributary) including grazing and fording.	302
- Water Withdrawal	High		Fully recorded, no further licences to be issued. Total irrigation licences equal 19,206 ac-ft.	307
- Water Quality	High		Overwintering of cattle and feedlots along the San Jose River.	301 307
Urbanization	High			302
- Population Level	Low		Approximately 10,400	302 301
- Extent	Low		Williams Lake and surrounding settlements	301 307
- Riparian Condition	High		Ongoing program to monitor and remove urban refuse, especially from lower reaches.	301 307
- Water Withdrawal			Domestic water licences equal 98,750 g/day and waterworks licences equal 3,569,000 g/day.	307
- Water Quality	High		Storm sewer discharge and snow disposal affect water quality. Leachate from landfill close to river requires investigation/monitoring.	301 302 307
Recreation				
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low			302
- Extent				

Watershed: Williams Lake River

- Water Quality				
- Riparian Condition				
Other Mining	Low		Some exploration	302
- Extent				
- Water Quality				
Industrial Development	High		Industrial development close to river downstream of Williams Lake.	302
- Extent	High		Several sawmills and the BC Railway. Industrial water licence equals 491,600 g/day.	301 302 307
- Water Quality	High		Runoff from industrial lands.	301
- Riparian Condition	High		Major bank slumping partially due to (past) disposal of industrial debris and storm water run-off causes high siltation and channel destabilization, encroachment.	301 302
Linear Development	High			301
- Extent	High		Throughout.	301
- Riparian Condition	High		Vehicles fording river at five sites where bridges have been removed.	301 302
Hydro Development	Low		None.	302
- Extent				
- Riparian Condition				

Watershed: Williams Lake River

Other Development	Low			301
- Extent	High		Ducks Unlimited operate a low head dam at the Williams Lake outlet which may contribute to summer low flows and high water temperatures.	301 302
- Riparian Condition			Not assessed.	301

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		Agriculture, urban, industrial and linear development concerns.	302

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	Thick accumulations of glacial drift.	307
Terrain	Low	Flat to gently rolling plateau, low relief basin.	307
Hydrology	High	Large yearly variations in flow during late summer - large portions of streambed may be dry during droughts. River is fully recorded, most extraction from the San Jose River and tributaries. High summer water use, low (6%) winter 7 day low flows.	307
Channel Stability	High	Extensive lateral movement below Williams Lake. Channel from Williams Lake to Fraser River is a gully.	302 307

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features		San Jose River between Lac La Hache and Williams Lake regulated by storage on Lac La Hache, regulation at Williams Lake by Ducks Unlimited dam. Control structure at the outlet of Williams Lake has no provision for upstream fish passage.	301 302 307
Sensitive Biological Features			
Significant Environmental Variables	X	High level of concern as Williams Lake is anoxic during the summer.	302
Unique Features	X	High public profile.	302

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management		Present.	
Commercial Fishery		Ocean fishery.	
Recreational Fishery		Ocean sport fishery.	
Native Fishery		Fraser River fishery.	

Restoration Activity			
Restoration Opportunity	X	Opportunity to investigate improving access for salmonids at Ducks Unlimited dam at the outlet of Williams Lake.	302
Enhancement Activity			
Enhancement Opportunity			

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	17	2	2	1

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Other	#1: Riverside walking trail proposed. #2: Joint MELP and Cattleman's Assc project to reduce serious phosphorous loading into the San Jose River.	302

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Identify and protect salmon habitats	Protect and restore stream habitat in cooperation with agricultural, urban and ranching communities. Develop a detailed riparian management plan for the Williams Lake River watershed identifying areas requiring site specific prescriptions.
	Apply the Land Development Guidelines as a minimum to residential and industrial development.
Restore and enhance habitat	Investigate the feasibility of improving access at the Ducks Unlimited dam at the outlet of Williams Lake.
Maintain/enhance water quantity for instream uses	Investigate the feasibility of improving summer flows by developing further storage or modifying existing storage.
	Develop a Water Management Plan that includes a determination of water demand, base flows necessary to sustain fisheries values and water storage opportunities.
Maintain/enhance water quality	Identify the source of water quality problems resulting from agricultural, industrial and urban development.
Rebuild and enhance salmon stocks	Invesitgate the feasibility of re-introducing coho through the "Streamkeepers" program.

Watershed: Narcosli Creek

Watershed Code: 00-4700 Drainage Area(ha): 170000

Habitat Management Area: Middle Fraser

Physiographic Area(s): Fraser Basin
Chilcotin Plateau

Biogeoclimatic Zone: Sub-Boreal Spruce
Interior Douglas Fir
Sub-Boreal Pine-Spruce

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	3.3	28.0	0.8	0.9	308	Reference for data is the stream mouth. WSC gauges 08KE003, 036, 035.

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Chinook	X	300	1991	139	300			M
Pink	X	330		96	330			M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low		MELP concerned about logging especially in the upper watershed	301 308
- Percent Total Logging	Low		10.5% of basin logged to 1991. High degree of sensitivity to logging relative to Chilcotin and West Road streams. Low % logging overall but harvesting is concentrated in sub-basins including Deserter Creek.	308
- Percent Recent Logging			4.6% recent, 5.8% proposed (1992-1997).	308
- ECA Status	High		Concern for ECA status in Deserter Creek where WAP (Level I) is being conducted in 1996/1997.	301
- Riparian Condition			Not assessed.	301
Agriculture	High		High water demand.	301
- Extent	High		Throughout, from Deserter Creek upstream to Twan Creek. Concerns with water demand and degradation of riparian habitat.	301

Watershed: Narcosli Creek

- Riparian Condition	High		Riparian degradation due to cattle fording, cattle watering, riparian grazing, streambank destabilization and dyke construction.	301 344
- Water Withdrawal	High		Several large water licenses issued, however no shortages or restrictions reported. Water storage on Twan Creek (tributary). Total irrigation licences equal 1396 ac-ft.	308
- Water Quality			Not assessed.	301
Urbanization	Low			301
- Population Level				
- Extent	Low		First Nations Reserves.	312
- Riparian Condition				
- Water Withdrawal				
- Water Quality				
Recreation				
- Extent				
- Riparian Condition				
- Water Quality				
Placer Mining	Low		None.	309 301
- Extent				

Watershed: Narcosli Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low			301
- Extent				
- Water Quality				
Industrial Development	Low			301
- Extent			Industrial water withdrawal equals 5000 g/day.	308
- Water Quality				
- Riparian Condition				
Linear Development	Low			301
- Extent	Low		Logging roads throughout	301
- Riparian Condition	Low		Stream crossings.	301
Hydro Development	Low			301
- Extent				
- Riparian Condition				

Watershed: Narcosli Creek

Other Development	Low		Some recreational activity including camping and associated impacts near mouth.	301
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	Low			301

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	Thick accumulations of glacial drift.	301 308
Terrain	Low	Flat to gently rolling plateau, low relief basin. Low resistance to change.	301 308
Hydrology	High	Low flows, especially in summer. High peak flows.	301 308
Channel Stability	Low	Some bank instability in range areas between Twain and Deserter Creeks. Boulders abundant, pockets of gravel.	301 310

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Man made rock dams for swimming restrict salmon passage.	309
Sensitive Biological Features	X	Cattle watering areas in chinook spawning habitat.	301
Significant Environmental Variables	X	High water temperatures in summer.	301
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery		Ocean fishery.	
Recreational Fishery		Ocean sport fishery.	
Native Fishery		Fraser River fishery.	

Restoration Activity			
Restoration Opportunity			
Enhancement Activity			
Enhancement Opportunity		Limited rearing and enhancement potential.	310

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	5	1	3	0

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Watershed Assessment Procedure	WAP for Deserter Creek underway. FRBC funded IWAPs in Narcosli Creek.	301
Other	DFO reconnaissance of range and agricultural use.	301

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Maintain/enhance water quantity for instream uses	In the long term, develop a Water Management Plan (WMP) that includes a determination of water demand, fisheries/minimum low flow of water storage opportunities, potential impacts of water extraction and water temperature concerns.
Maintain/enhance water quality	Address problems with removal of riparian vegetation and bank de-stabilization from cattle fording and watering by exclusion fencing and riparian re-vegetation.
	Develop and implement a detailed riparian management plan (RMP) for the Narcosli watershed identifying areas requiring site specific prescriptions for agricultural and ranching activities.
Maintain/enhance watershed and stream channel integrity and stability	Assess the cumulative impacts agriculture, ranching and forestry activities on fisheries values on a watershed level. An Interior Watershed Assessment is currently being conducted to evaluate the impacts of forestry development on watershed hydrology.

Watershed: Baker Creek

Watershed Code: 00-5100

Drainage Area(ha): 157000

Habitat Management Area: Middle Fraser

Physiographic Area(s): Fraser Basin
Chilcotin Plateau

Biogeoclimatic Zone: Sub-Boreal Pine-Spruce
Sub-Boreal Spruce
Montane Spruce

STREAMFLOW CHARACTERISTICS

Stream Flows	Mean Annual	Mean Flood	Mean 7 Day Low Flow		Ref.	Comment:
			Summer	Winter		
(m3/s)	3.7	27.8	0.8	0.8	308	Reference for above data is the stream mouth. WSC gauge 08KE016.
			Sept	Feb		

SALMON ESCAPEMENT

Species	Present	Historical Max	Historical Max Year	1981-1992 Ave.	1981-1992 Max.	1969-1980 Ave.	Trend For '81-92 to '69-80 Ave.	Rebuild Potential
Chinook	X	400	1991	244	400		Unk	M
Pink	X	450		200	450		Unk	M

DEVELOPMENT ACTIVITY

Type	Level of Concern	Values	Comment	Ref.
Forestry	Low			301
- Percent Total Logging	Low		11% of basin logged to 1991	301 308
- Percent Recent Logging			3% recent, 3.5% proposed (1992-1997)	308
- ECA Status	Low			
- Riparian Condition	Low		Some site specific impacts	301
Agriculture	Low		Back flood irrigation practiced in upper reaches.	301 308
- Extent			Not assessed - activity throughout.	301

Watershed: Baker Creek

- Riparian Condition	Low		Some cattle fording sites near Puntchesaku Lake Provincial Park.	309
- Water Withdrawal	High		Potential for high September water use. Irrigation licences total 1,013 ac-ft.	308
- Water Quality				
Urbanization	High			301
- Population Level			23,500 in Quesnel area.	304
- Extent	High		Primarily in Quesnel and surrounding area.	301
- Riparian Condition	High		Dyking, bank stabilization (riprap, channelization) in lower river.	301
- Water Withdrawal			Domestic water licences total 13,000 g/day and waterworks licences total 1,000,000 g/day.	308
- Water Quality	Low		Storm drain runoff, potential chlorine spills from swimming pools.	301 310
Recreation	Low			301
- Extent			Pinnacles and Puntchesakut Provincial Parks.	
- Riparian Condition				
- Water Quality				
Placer Mining	Low			301
- Extent	Low		At confluence with Fraser River mainstem.	301

Watershed: Baker Creek

- Water Quality				
- Riparian Condition				
Other Mining	Low		None.	301
- Extent				
- Water Quality				
Industrial Development	Low		Light industrial development centered at Quesnel.	310 301
- Extent	Low		Industrial water withdrawal totals 16,001 g/day.	308
- Water Quality	Low		Runoff.	301
- Riparian Condition	Low		Site specific impacts.	301
Linear Development	Low			35
- Extent	Low		Pipeline crossing in lower river near urban area. Logging roads throughout, urban roads.	301 309
- Riparian Condition	Low		Site specific impacts.	301
Hydro Development	Low			301
- Extent				
- Riparian Condition				

Watershed: Baker Creek

Other Development				
- Extent				
- Riparian Condition				

CUMULATIVE DEVELOPMENT

Type	Level of Concern	Values:	Comment	Ref.
Cumulative Development	High		Urban, agricultural and forestry.	301

BIOPHYSICAL CONDITIONS

Type	Level of Concern	Comment	Ref.
Soils	Low	Thick accumulations of glacial drift.	301 308
Terrain	Low	Flat to gently rolling plateau, low relief basin.	308
Hydrology	High	Low summer and winter flows, high peak flows, man-made rock dams for swimming holes in lower 2 kilometers obstruct migration.	301 308
Channel Stability	Low	Dyking and bank stabilization adjacent to urban areas.	301 308

SENSITIVE WATERSHED and HABITAT FEATURES

Type	Present	Comments	Ref.
Sensitive Physical Features	X	Deep canyon in lower reaches - steep banks in vicinity of Pinnacles Provincial Park.	301
Sensitive Biological Features	X	Pink spawning occurs at confluence with Fraser River within the city of Quesnel. Beaver dams in upper reaches.	301 308
Significant Environmental Variables	X	High summer water temperatures.	301
Unique Features			

SPECIAL CONSIDERATIONS

Type	Present	Comments	Ref.
Stock Management			
Commercial Fishery		Ocean fishery.	
Recreational Fishery		Ocean sport fishery, rainbow trout fishing in reach adjacent to urban area restricted to children.	308
Native Fishery		Fraser River fishery.	

Restoration Activity			
Restoration Opportunity	X	Restoration opportunities in City of Quesnel area include riparian planting.	301 304
Enhancement Activity	X	Boulder riffle structure constructed 320 meters upstream from Fraser River confluence for pink spawners. Log jam removal in canyon area. Baker Creek Enhancement Society formed in 1996.	301 308 309
Enhancement Opportunity	X	Mount Creek has good chinook rearing and may have spawning potential.	301 308 309

SUMMARY OF HABITAT CONCERNS (no. of high ratings)

Salmon Present	Development Activity	Biophysical Conditions	Sensitive Watershed and Habitat Features	Special Considerations
Yes	5	1	3	4

RECENT WATERSHED PLANNING/PROJECT INITIATIVES

Type	Comments	Ref.
Watershed Assessment Procedure	Interior Watershed Assessment Procedure funded by FRBC.	301
Inventory and Assessment	Salmonid habitat inventory, restoration and enhancement opportunities in the vicinity of Quesnel.	304
Other	Baker Creek Community Enhancement Project: 5-7 year project with the objective to enhance both lower reaches and upper reaches of the watershed for fish and wildlife as per DFO's streamkeepers handbook.	311

SPECIFIC OBJECTIVES AND STRATEGIES

Specific Objectives	Specific Strategies
Restore and enhance habitat	Support and expand community project for a recreational park in the lower river to include restoration opportunities throughout the entire watershed.
	Initiate a watershed restoration assessment and inventory for development of a Watershed Restoration Plan.
	Incorporate a minimum flow assessment and water management plan into the Baker Creek Enhancement Project.
	Continue restoration of riparian areas in urban reaches of lower Baker Creek.
Maintain/enhance water quantity for instream uses	Determine actual licence demand and review water management options prior to approving new licences.
	Develop a Water Management Plan (WMP) that includes a determination of water demand, base flows to sustain fisheries values, water storage opportunities and potential impacts of agricultural and urban water extraction.
Maintain/enhance water quality	Assess high summer water temperature concerns.
	Implement a water drainage management plan for sensitive soils, stream crossings or other areas specified in development plans.

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