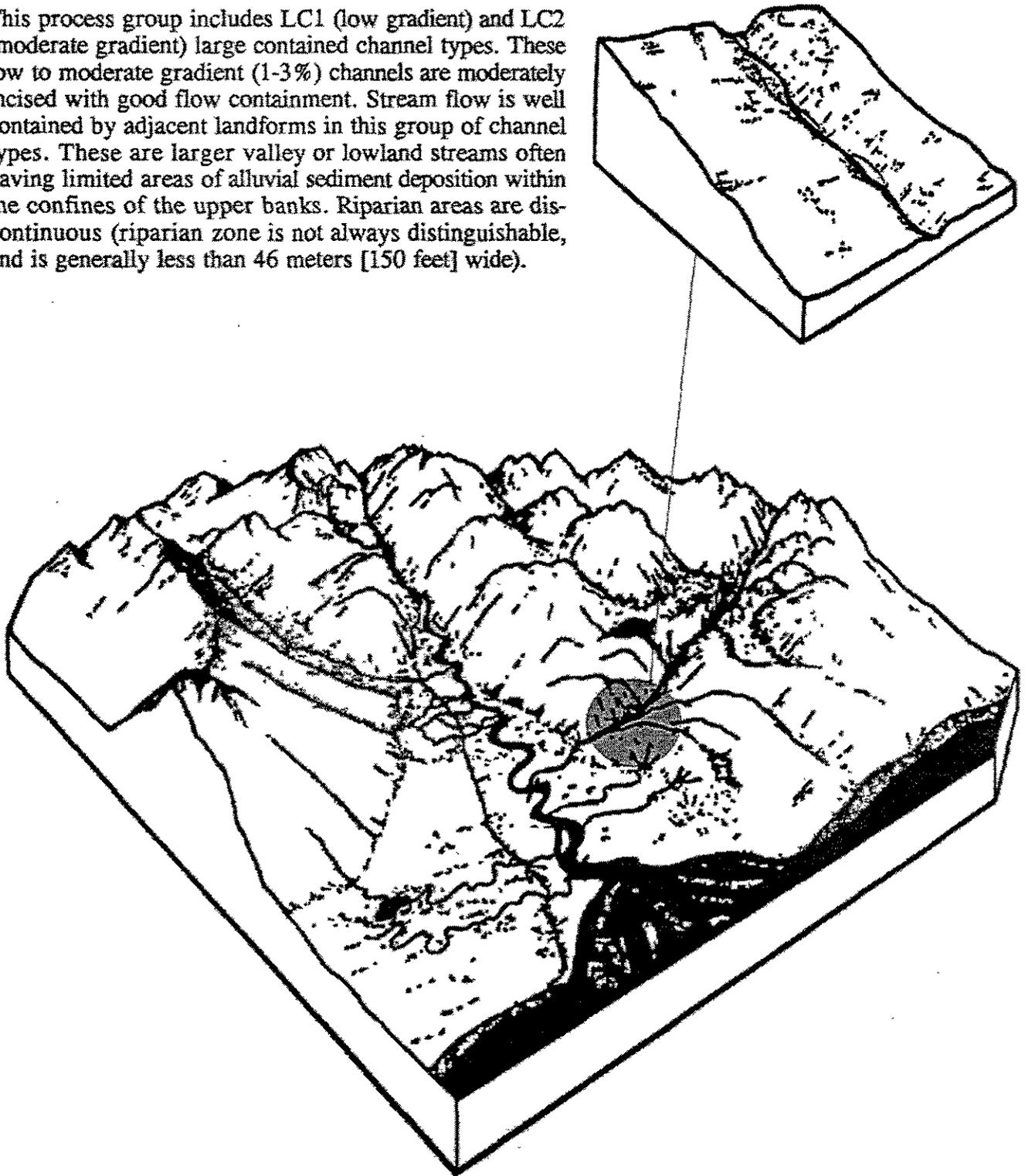


LARGE CONTAINED PROCESS GROUP

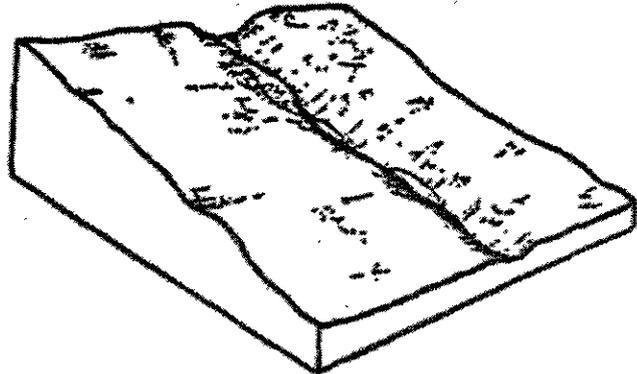
This process group includes LC1 (low gradient) and LC2 (moderate gradient) large contained channel types. These low to moderate gradient (1-3%) channels are moderately incised with good flow containment. Stream flow is well contained by adjacent landforms in this group of channel types. These are larger valley or lowland streams often having limited areas of alluvial sediment deposition within the confines of the upper banks. Riparian areas are discontinuous (riparian zone is not always distinguishable, and is generally less than 46 meters [150 feet] wide).



LOW GRADIENT CONTAINED CHANNEL
Channel Mapping Symbol: LC1 (Formerly C2)

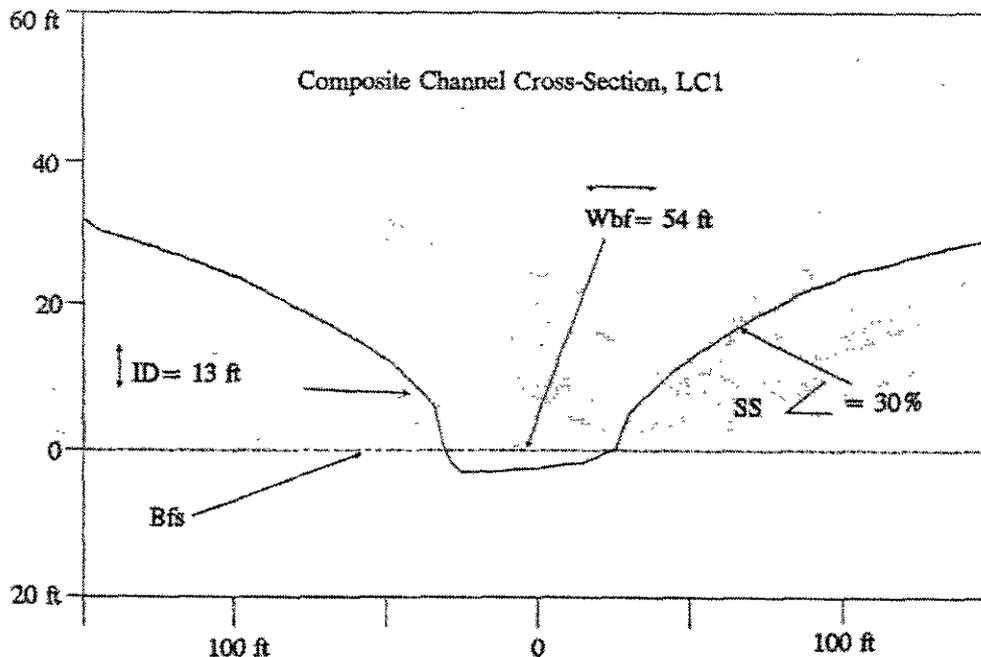
PHYSICAL CHARACTERISTICS

Geographic Setting: LC1 channels are normally situated in broad valley bottoms largely composed of lowlands landforms. Hills and mountainslopes may abut one bank of the LC1 channel type. Lateral channel migration is generally controlled by frequent bedrock outcrops along stream banks.



Similar Channel Types: MC1, MC2, LC2

Channel Structure



- Channel Gradient:..... <2%, mean = 1%
- Incision Depth: <10 m (33 ft), mean = 4 m (13 ft)
- Bankfull Width:..... > 10 m (33 ft), mean = 16 m (54 ft)
- Dominant Substrate: Coarse gravel to bedrock
- Stream Bank Composition: Bedrock or mixed
- Sideslope Length: <20 m (66 ft), mean = 10 m (33 ft)
- Sideslope Angle: Mean = 30% (20 degrees)
- Channel Pattern:..... Single, linear channel, rectangular pattern
- Drainage Basin Area:..... 13-52 km² (5-20 mi²)

LARGE CONTAINED PROCESS GROUP

Riparian Vegetation: The riparian plant communities are dominantly western hemlock series, with the Sitka spruce series and the mixed conifer series also being significant. The LC1g phase is dominated by the Sitka spruce and western hemlock-red cedar series. Nonforest riparian plant communities are dominated by red alder, willow, and salmonberry shrub communities.

Plant Association Series	% Cover	
	LC1	LC1g
Western Hemlock	43%	15%
Mixed Conifer	15%	23%
Sitka Spruce	12%	19%
Western Hemlock-Red Cedar	12%	31%
Shore Pine	9%	---
Western Hemlock-Alaska Cedar	2%	---
Nonforest	4%	5%
Mountain Hemlock	---	6%

Channel Type Phases:

- LC1g - GLIDE PHASE has consistently lower gradient stream reaches than is typical for LC1 channels. This phase tends to occur where channel base level is controlled by a downstream feature such as resistant bedrock outcrops or a lake inlet or outlet.
- LC1r - MORaine PHASE has bank control from glacial moraine deposits. Stream substrate has a larger boulder component, and sideslope stability may be lower than is typical for LC1 channels.

MANAGEMENT CONSIDERATIONS

Hydrologic Function: LC1 channels store and transport sediment. Stream substrate is predominantly bedrock and larger boulder and cobble material, intermingled with pockets of gravel or cobble sized material. Silt, sand and fine gravels are typically flushed through LC1 channels. During high flow events, which are well contained by the stable upper banks, fines to cobble size materials are mobilized and transported downstream. Large woody debris volumes are relatively low in these channels. Where large woody debris accumulations do occur, significant amounts of coarse to fine gravels and sand can be retained.

Aquatic Habitat Capability

Large Woody Debris 2000 ft³/1000 linear ft
 Available Spawning Area (ASA) Avg = 6% for 25 sites
 Available Rearing Area (ARA) Avg = 18% for 25 sites

Indicator Species Ratings

<u>MIS</u>	<u>ASA</u>	<u>ARA</u>
Coho.....	MOD	MOD
Pink.....	MOD	NEG
Chum.....	MOD	NEG
Sockeye.....	LOW	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	HIGH	HIGH
Steelhead.....	MOD	HIGH

LC1 channels are frequently accessible to anadromous species, however, partial or complete barriers can occur at bedrock knickpoints. These channels are frequently used by spawning pink, chum, and steelhead species, and occasionally by coho. Spawning areas are limited due to the predominately large substrates. LC1 channels may have limited rearing potential, except in areas of large woody debris accumulations. Steelhead and resident Dolly Varden frequently use boulder-pool habitat in these channels for rearing. LC1 channels provide extensive overwintering habitat for steelhead trout.

Riparian Management Considerations

Concern for Management of:

Large Woody Debris.....	LOW
Sediment Retention.....	LOW
Stream Bank Sensitivity.....	LOW
Sideslope Sensitivity.....	MOD
Flood Plain Protection.....	N/A
Culvert/Fish Passage.....	LOW

Inchannel woody debris accumulations have limited influence on channel form and habitat capability due to the large degree of bedrock control. Large debris enters the channel primarily from stream sideslopes. High flows in these well contained channels tend to move all but the most stable wood accumulations downstream or push debris to channel margins.

Stream banks are generally stable due to bedrock influence. Sideslopes can be susceptible to mass wasting erosion in areas with higher than average sideslope angles, or in channel segments with weathered bedrock, glacial till, or volcanic ash parent materials. Road construction near LC1 channels should emphasize maintenance of channel sideslope stability (BMPs 14.2, 14.3, 14.7, 14.8).

These are generally classified as Value Class I streams. A minimum 100 foot timber harvest buffer is required along both banks of these streams (Tongass Timber Reform Act, 1991). Control of inchannel operations is another important riparian management concern (BMP 14.14).

LARGE CONTAINED PROCESS GROUP

Riparian Management Opportunities:

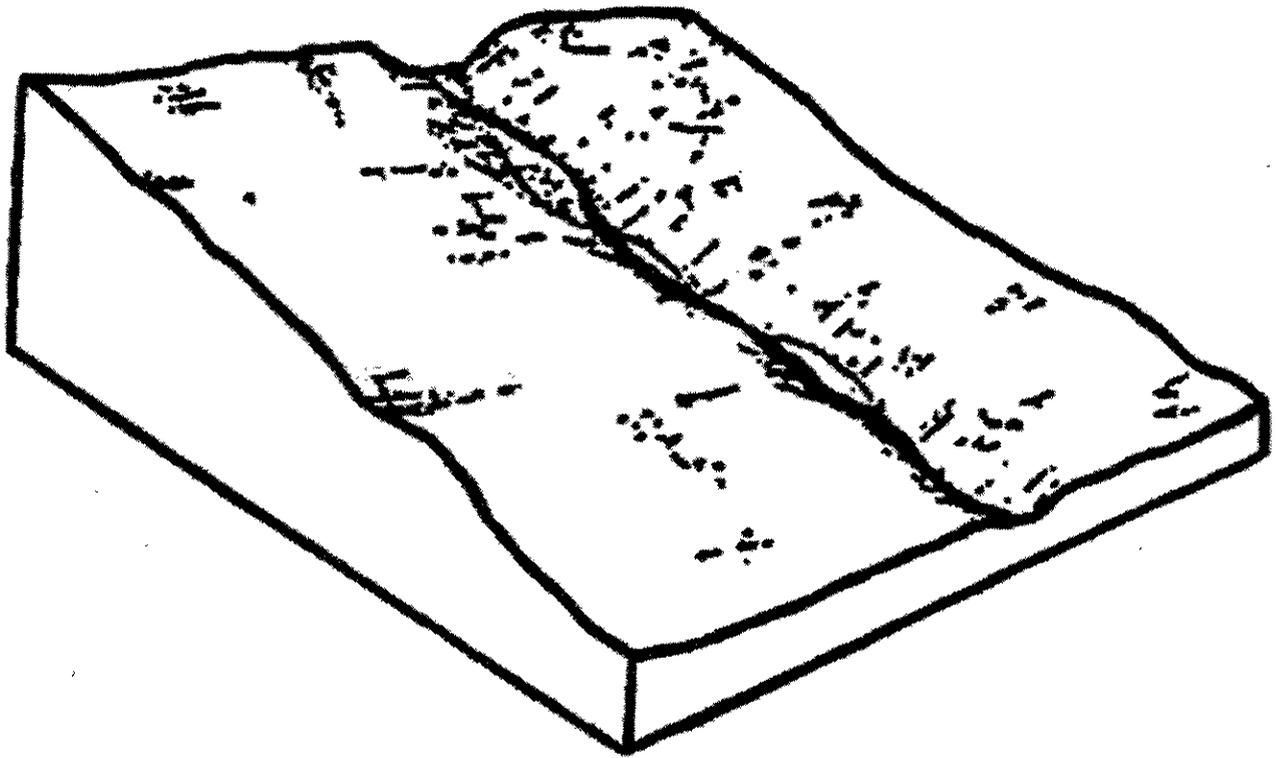
Sport Fish Potential.....MODERATE

Enhancement OpportunitiesLarge Wood Placement and Barrier Modification

Sport fishing opportunities are generally limited to bedrock scour pools and pools below water falls. Primary species of interest include steelhead, Dolly Varden, and pink salmon.

Opportunities exist for increasing limited rearing and spawning area by anchoring large pieces of wood in LC1 channels. Bedrock falls and cascades can be obstructions to upstream fish migration. Barrier modification may also be an enhancement opportunity

Large Contained Process Group

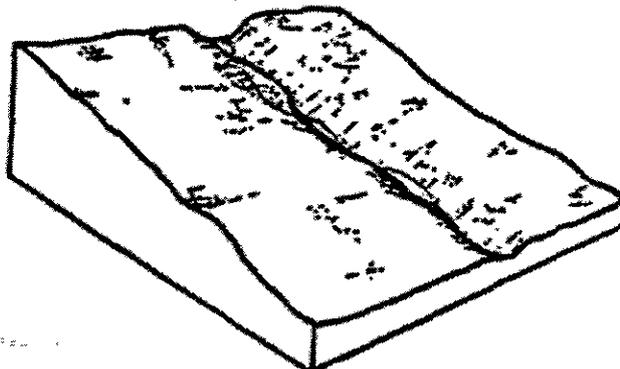


MODERATE GRADIENT CONTAINED NARROW VALLEY CHANNEL

Channel Mapping Symbol: LC2 (Formerly C5)

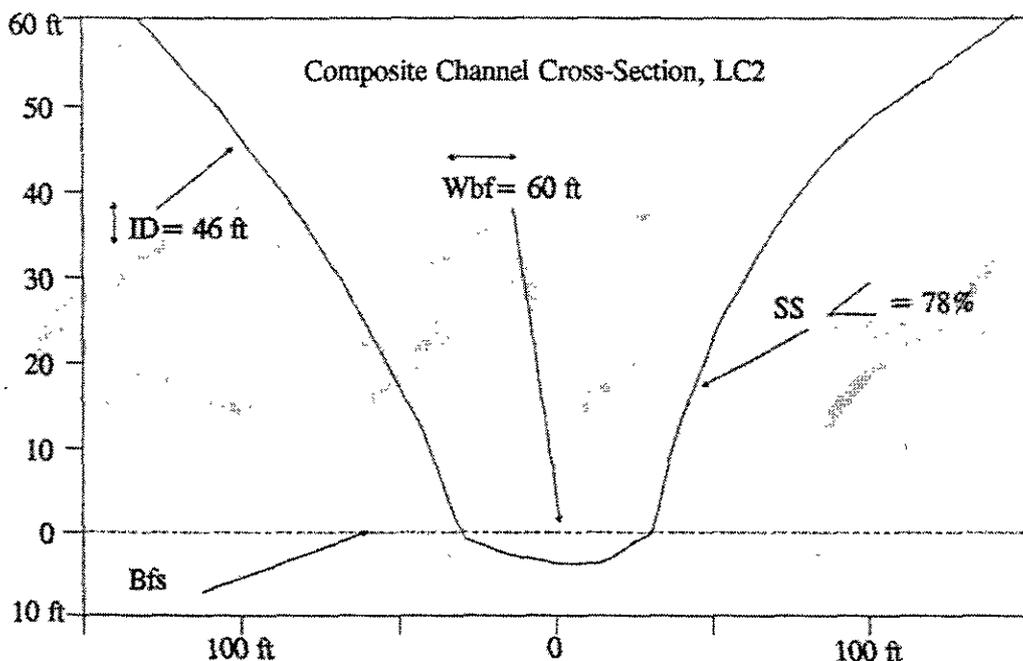
PHYSICAL CHARACTERISTICS

Geographic Setting: LC2 streams flow through narrow valleys situated in the middle to lower sections of a watershed. Hillslopes and mountainslopes composing the valley walls may lie directly adjacent to the LC2 channel. The adjacent valley floor is consistently narrow, with little river terrace development. Bedrock knickpoints, short falls, cascades, and boulder runs may be present.



Similar Channel Types: MC3, LC1

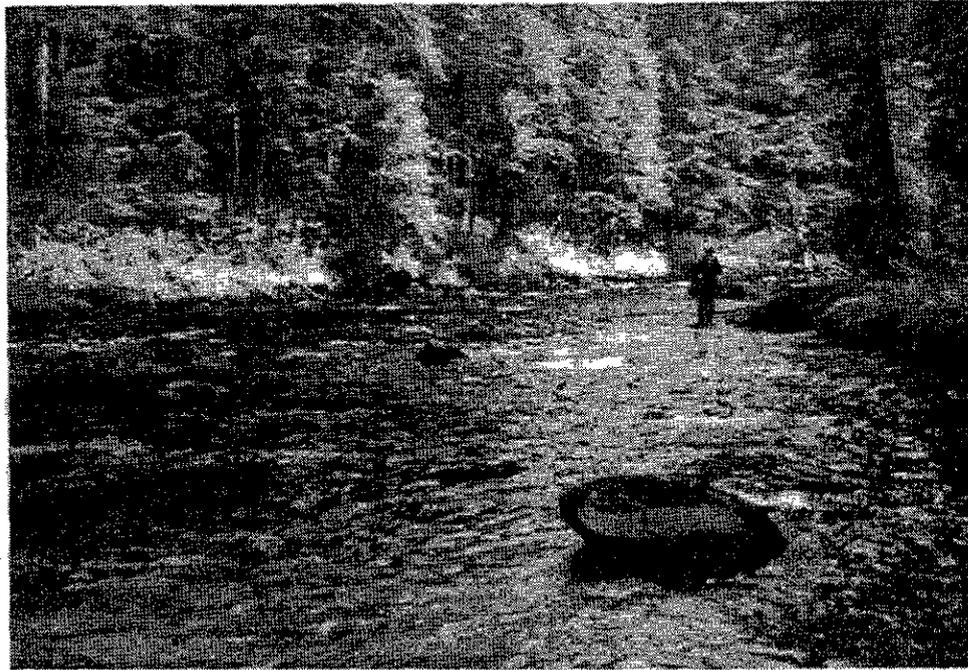
Channel Structure



- Stream Gradient: <5%, mean = 2%
- Incision Depth: Variable, mean = 14 m (46 ft)
- Bankfull Width: 10-30 m (33-99 ft), mean = 18 m (60 ft)
- Dominant Substrate: Coarse gravel to bedrock
- Stream Bank Composition: Bedrock or mixed
- Sideslope Length: Variable, mean = 11m (35ft)
- Sideslope Angle: Mean = 78% (38 degrees)
- Channel Pattern: Single, linear
- Drainage Basin Area: 13-52 km² (5-20 mi²)

Riparian Vegetation: The riparian plant communities are dominated by the western hemlock series, with western hemlock/blueberry being the most common plant association. The Sitka spruce series is also significant.

INCHANNEL PHOTO: LC2



Plant Association Series	% Cover
Western Hemlock	44%
Sitka Spruce	29%
Mountain Hemlock	9%
Mixed Conifer	8%
Western Hemlock-Alaska Cedar	6%
Nonforest	4%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: LC2 channels are sediment transport systems. Moderate gradient, well contained stream flow, and large clast substrate are indicative of high stream energy. Sediment inputs from upstream mountainslope channels are rapidly transported through these channels. Mass wasting along channel sideslopes is a major on-site contributor of sediment. Sediment contributions from stream banks are of minor significance because they are largely composed of bedrock or large rock fragments. Cobble and coarse gravel deposits are common substrate components around boulder clusters or large woody debris. Fine sediments are readily flushed through these streams.

Aquatic Habitat Capability

Large Woody Debris2500 ft³/1000 linear ft
 Available Spawning Area (ASA)Avg = 11% for 10 sites
 Available Rearing Area (ARA)Avg = 15% for 10 sites

LARGE CONTAINED PROCESS GROUP

Indicator Species Ratings

<u>MIS</u>	<u>ASA</u>	<u>ARA</u>
Coho.....	MOD	MOD
Pink.....	LOW	NEG
Chum.....	LOW	NEG
Sockeye.....	LOW	NEG
Chinook.....	LOW	MOD
Dolly Varden.....	HIGH	HIGH
Steelhead.....	MOD	MOD

LC2 channels are frequently accessible to anadromous species, but often contain barriers that block upstream fish movement. Typically these streams get occasional use by spawning salmonids, however, Dolly Varden and steelhead show the most frequent use of spawning areas. These channels do have some good rearing areas, especially in reaches with stable large woody debris. Chinook salmon, Dolly Varden, and steelhead tend to favor rearing in LC2 channels more than coho due to availability of boulder-pool habitats.

Riparian Management Considerations

Concern for Management of:

Large Woody Debris	LOW
Sediment Retention	LOW
Stream Bank Sensitivity	LOW
Sideslope Sensitivity	HIGH
Flood Plain Protection Need	N/A
Culvert Fish Passage.....	LOW

Large wood accumulations have limited influence on LC2 channel morphology. Relatively high stream energy in LC2 channel types tends to displace inchannel debris to bank areas. Total woody debris loading is moderate and is composed of large diameter (45.7-76.2 cm [18-30 inch]) pieces longer than 15.2 meters (50 feet) in length. Large wood incorporated into the stream bed can have an important function trapping gravel and cobble substrate used for spawning habitat.

Stream banks in LC2 channels are relatively stable due to the high amounts of bedrock and boulders incorporated into them. However, channel sideslopes are steep (75%) and susceptible to mass erosion if disturbed by road cuts, blowdown, or timber yarding. Riparian management should emphasize protection of unstable sideslopes (BMPs 13.5, 13.9).

Due to long, steep sideslopes adjacent to the channel, road crossings are generally not practical along LC2 channel types. Suitable crossing sites generally require multi-span bridges. Special road location and design (BMPs 14.2, 14.3), and slope stabilization measures (BMPs 14.7, 14.8) should be considered for these streams.

These are typically classified as Value Class I or II streams. A minimum 100 foot timber harvest buffer is required along both banks of these streams (Tongass Timber Reform Act, 1991).

Riparian Management Opportunities:

Sport Fish Potential.....MODERATE

Enhancement OpportunitiesBarrier Removal

Some sport fish opportunities usually exist near the mouth of LC2 channel segments. Anadromous fish can usually access the lower reaches of these streams, but barrier falls and cascades are very common in LC2 segments. Species of interest include steelhead and cutthroat trout, coho and pink salmon, and Dolly Varden char. The best angling sites are in scour pools below falls and chutes.

Barrier removal may be an enhancement option where sufficient high quality habitat occurs above LC2 channels and where falls are not too large or numerous to make fish ladder projects uneconomical. An alternative to barrier removal includes the creation or maintenance of quality resident fisheries above the barrier.

Large Contained Process Group

