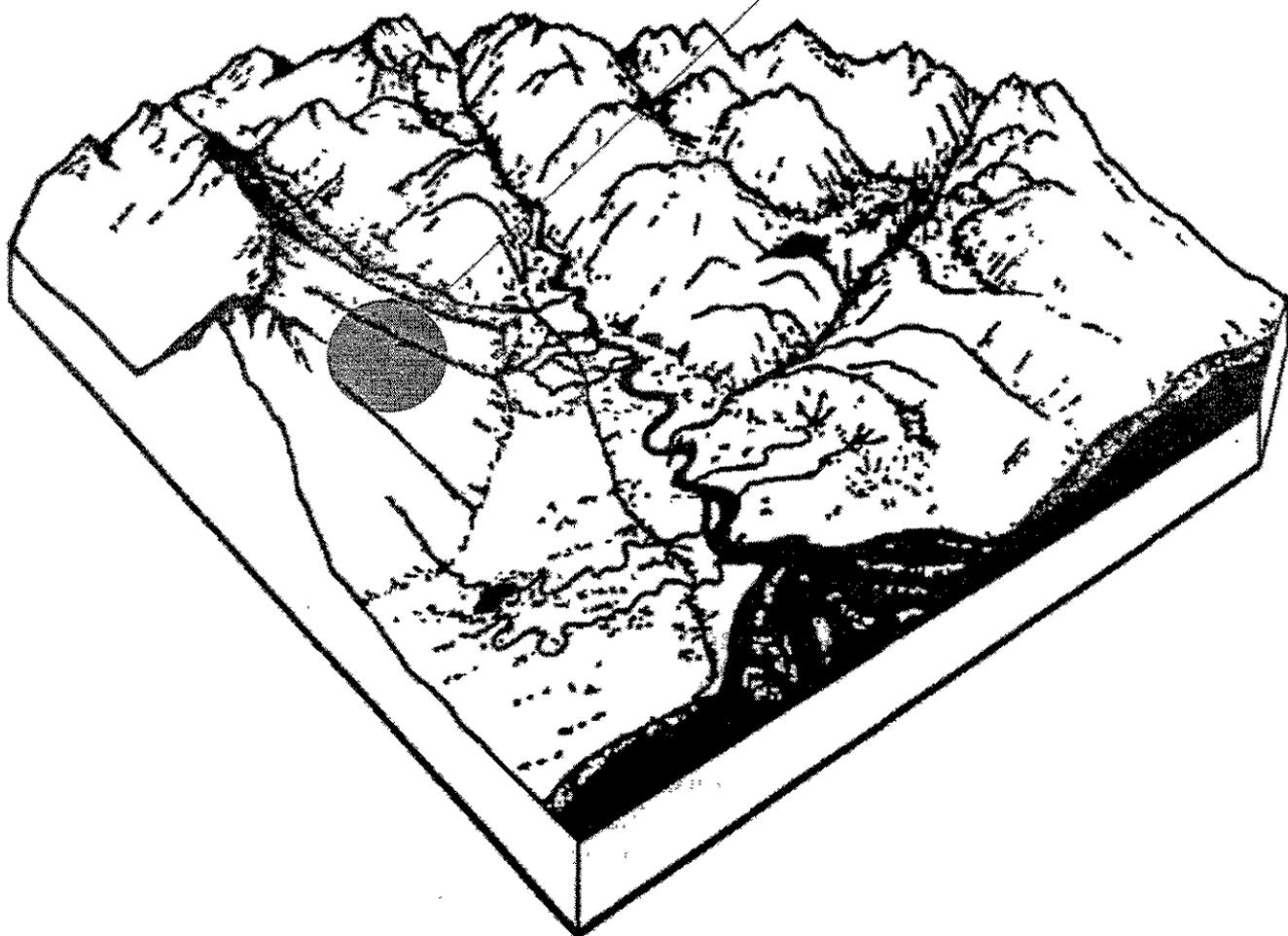
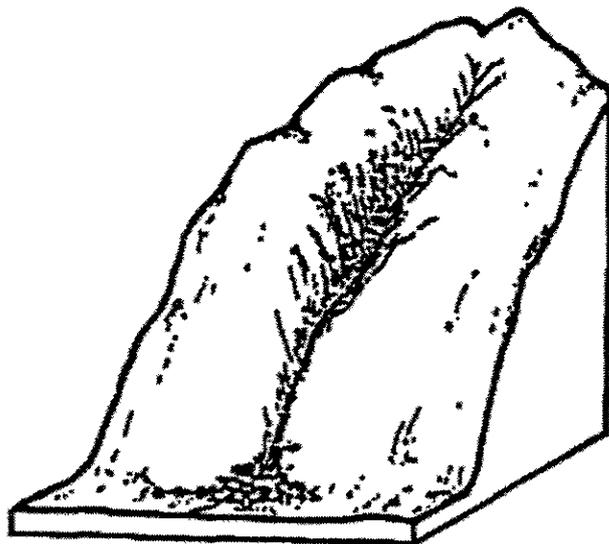


HIGH GRADIENT CONTAINED PROCESS GROUP

This process group includes HC1, HC2, HC3, HC4, HC5, and HC6 channel types which are shallowly to deeply incised, high gradient (over 6%), mountainslope streams. High to moderate gradient glacial meltwater streams, HC8 and HC9 channel types, are also included in this process group. These first and second order headwater channels are characterized as primary sediment source zones. Relatively high stream energy enables these streams to transport large sediment loads during spring and fall freshets. The associated riparian area generally extends to the upper stream bank slope break.

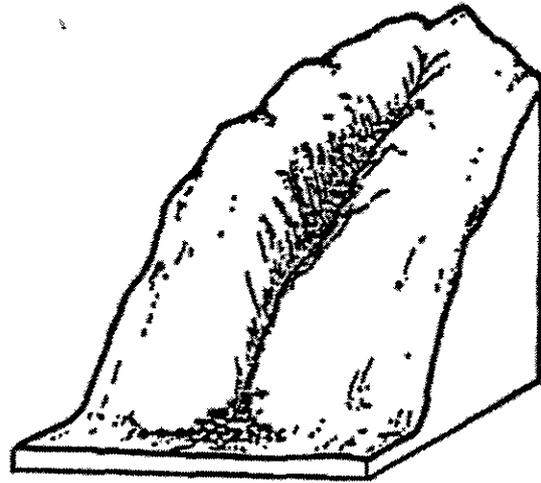


SHALLOWLY INCISED MUSKEG CHANNEL

Channel Mapping Symbol: HC1 (Formerly A6)

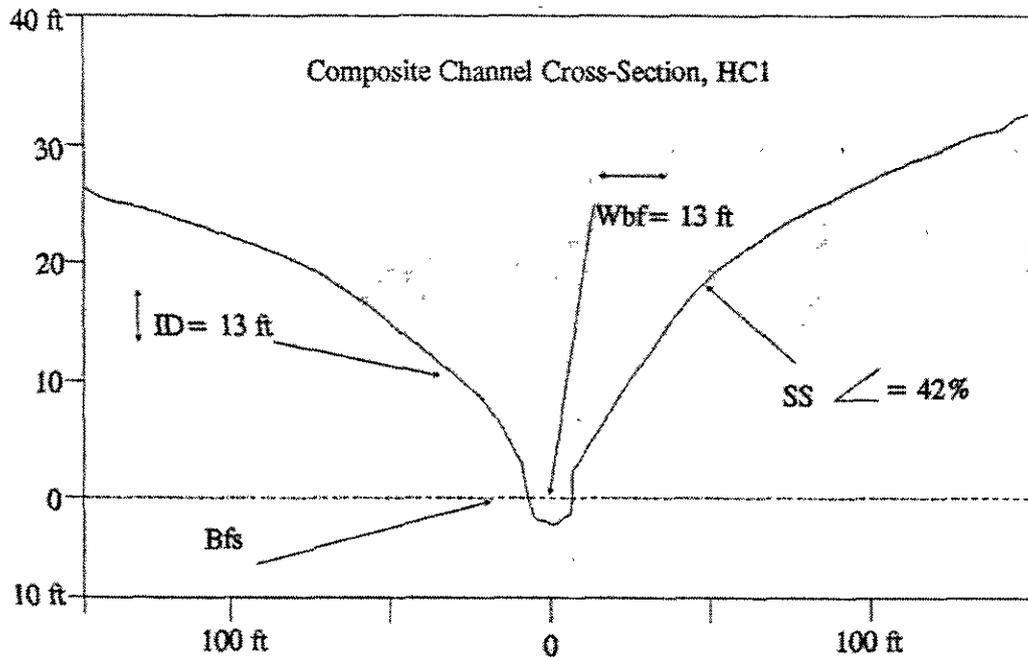
PHYSICAL CHARACTERISTICS

Geographic Setting: HC1 streams are mostly restricted to hill and lowland landforms. The HC1 channel type consists of narrow, high gradient, shallow to moderately incised streams. HC1 streams are commonly tributaries to MC1 and MC2 channel types. They also occur in conjunction with HC3 streams, where localized geologic knickpoints influence incision depth. Although not deeply incised, they are well contained and are usually influenced by bedrock control.



Similar Channel Types: HC2, HC4

Channel Structure



- Stream Gradient:6-15%, mean = 9%
- Incision Depth:< 6 m (20 ft), mean = 4 m (13 ft)
- Bankfull Width:.....1-8 m (3-26 ft), mean = 4 m (13 ft)
- Dominant Substrate:Small cobble to bedrock
- Stream Bank Composition:Mixed to bedrock
- Sideslope Length:< 10 m, mean = 7.3 m (24 ft)
- Sideslope Angle:Mean = 42% (23 degrees)
- Channel Pattern:.....Single, linear
- Drainage Basin Area:.....< 2.6 km² (< 1 mi²)

LANDSCAPE PHOTO: HC1



PHOTO: HC1

Additional information regarding the photo and its location.

INCHANNEL PHOTO: HC1



HIGH GRADIENT CONTAINED PROCESS GROUP

Riparian Vegetation: The riparian plant communities are dominantly mixed conifer series. Other common riparian communities include western hemlock series, western hemlock/Alaska cedar series, and nonforested muskeg or meadow communities.

Plant Association Series	% Cover
Mixed Conifer	44%
Nonforest	14%
Mountain Hemlock.....	11%
Western Hemlock	11%
Western Hemlock-Alaska Cedar.....	9%
Sitka Spruce-Cottonwood.....	4%
Western Hemlock-Red Cedar	4%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC1 channels are sediment transport systems. They receive material from headwater mass wasting and hillslope erosion processes. Stream banks and sideslopes are typically quite stable, so only minor amounts of sediment and debris are introduced locally. Steep gradients and moderate stream power result in little inchannel sediment storage.

Aquatic Habitat Capability

Large Woody DebrisInsufficient data
Available Spawning Area (ASA).....Insufficient data
Available Rearing Area (ARA).....Insufficient data

Indicator Species Ratings

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

HC1 channels have limited fish access due to high stream flow velocities and numerous barriers. These channels may get occasional use by anadromous species at their confluence with lower gradient channels. Little spawning and rearing habitat is available, however, limited use by resident Dolly Varden char can occur. Overwintering habitat is insignificant. As source waters, these channels can affect downstream anadromous fish habitat through transport of sediment, large woody debris, nutrients, and aquatic insects.

Riparian Management Considerations

Concern for Management of:

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

Few management concerns are associated with HCl channels. Stream banks are bedrock controlled and relatively stable. Moderate sideslope angles and channel incision contribute to sideslope stability.

These are classified as Value Class II or III streams. A minimum 100 foot timber harvest buffer is occasionally required where significant resident fish populations occur (Tongass Timber Reform Act, 1991).

If stream harvest buffers are not required (Class III channels), harvest unit design should account for water quality protection requirements for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

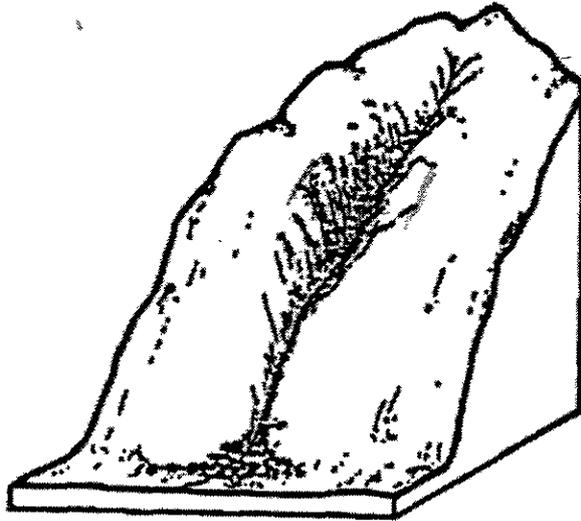
Sport Fish Potential	N/A
Enhancement Opportunities	N/A

SHALLOWLY TO MODERATELY INCISED FOOTSLOPE CHANNEL

Channel Mapping Symbol: HC2 (Formerly A7)

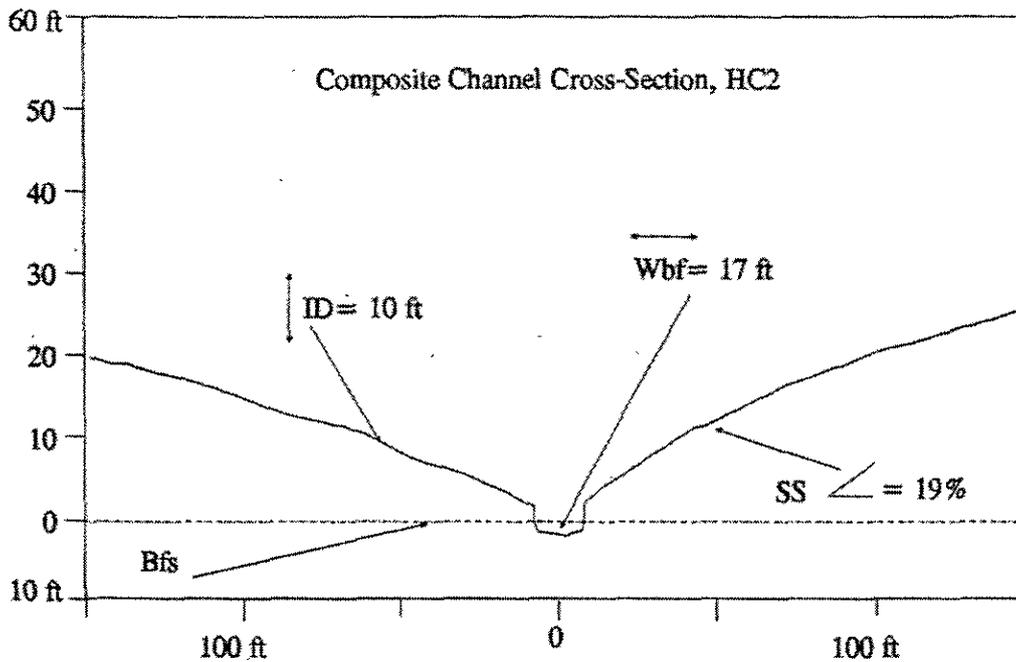
PHYSICAL CHARACTERISTICS

Geographic Setting: The HC2 streams are predominantly associated with footslope landforms. Hill landforms are less frequently found adjacent to these channels. The HC2 channel type consists of high gradient, footslope streams, well contained by moderate (less than 10 meters [33 feet]) sideslope development. HC5 and HC6 channels commonly grade into an HC2 channel. HC2 channels are often tributaries to MM1 or MM2 streams. Stream bank composition is predominantly alluvium, although bedrock segments may occur as inclusions.



Similar Channel Types: AF2, MM2

Channel Structure



- Stream Gradient:6-15%, mean = 10%
- Incision Depth:1-10 m (3-33 ft), mean = 3 m (10 ft)
- Bankfull Width:.....1-15 m (3-50 ft), mean = 5 m (17 ft)
- Dominant Substrate:Coarse gravel to small boulder
- Stream Bank Composition:Alluvium or colluvium
- Sideslope Length: < 15 m (50 ft), mean = 10 m (33 ft)
- Sideslope Angle: < 30%, mean = 19% (11 degrees)
- Channel Pattern:.....Single, linear
- Drainage Basin Area:..... < 2.6 km² (< 1 mi²)

INCHANNEL PHOTO: HC2



Riparian Vegetation: The riparian plant communities are dominantly western hemlock series, with western hemlock/blueberry the most common plant association. The nonforested communities and Sitka spruce series are also well represented. Nonforested salmonberry, Sitka alder, and red alder shrub communities occur adjacent to the stream 46 percent of the time.

Plant Association Series	% Cover
Western Hemlock	38%
Nonforest	27%
Sitka Spruce	17%
Mixed Conifer	12%
Shore Pine	2%

Channel Type Phases:

- HC2s - SHRUB PHASE consists primarily of brush vegetation.

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC2 channels are sediment transport systems. Sediment is delivered from steep mountain headwaters. Since HC2 channels are situated on alluvial/colluvial footslopes, stream bank erosion can introduce significant sediment loads to these channels. However, most sediment is rapidly transported downstream. Some retention of fine sediment occurs in small pools behind woody debris jams.

Aquatic Habitat Capability

Large Woody Debris	4200 ft ³ /1000 linear ft
Available Spawning Area (ASA)	Avg = 3% for 12 sites
Available Rearing Area (ARA)	Avg = 6% for 12 sites

HIGH GRADIENT CONTAINED PROCESS GROUP

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	LOW	LOW
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye.....	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	MOD	MOD
Steelhead.....	NEG	NEG

Due to high streamflow velocities, HC2 channels are only occasionally accessible to anadromous species. Lower reaches near the confluence with accessible valley channels have the best fish habitat potential. HC2 channels have marginal spawning potential and limited rearing capability. Overwintering capability is insignificant. They are used primarily by Dolly Varden char. However, due to their location in sediment/water source areas of watersheds, they typically affect downstream fish habitat productivity.

Riparian Management Considerations

Concern for Management of:

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

The HC2 channel has relatively high woody debris loading. Maintenance of this large woody debris source is important in that the wood traps bedload sediment and forms pool habitat for resident fish (BMP 12.6).

Shallow channel incision and sideslope angle contribute to high channel sideslope stability. However, unconsolidated alluvial bank material along some channel segments makes the streams moderately susceptible to bank erosion and lateral channel migration (BMPs 13.16, 13.9, 14.17).

Fish passage through road culverts located near the confluence of HC2 channels with lower gradient channels can be a concern (BMP 14.7).

These are classified as Value Class II or III streams. A minimum 100 foot timber harvest buffer is occasionally required where significant resident fish populations occur (Tongass Timber Reform Act, 1991).

If stream harvest buffers are not required (Class III channels), harvest unit design should account for water quality protection requirements for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

Sport Fish Potential..... N/A

Enhancement Opportunities Large Wood Placement

Stream segments which are tributary to low gradient flood plain channels can provide opportunities for large wood placement to create pool habitat for resident or anadromous fish, particularly Dolly Varden char, cutthroat, and steelhead trout.

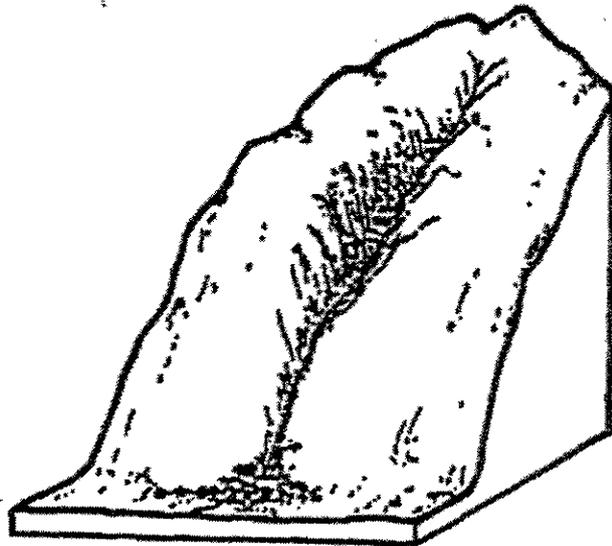
DEEPLY INCISED UPPER VALLEY CHANNEL

Channel Mapping Symbol: HC3 (Formerly A2)

PHYSICAL CHARACTERISTICS

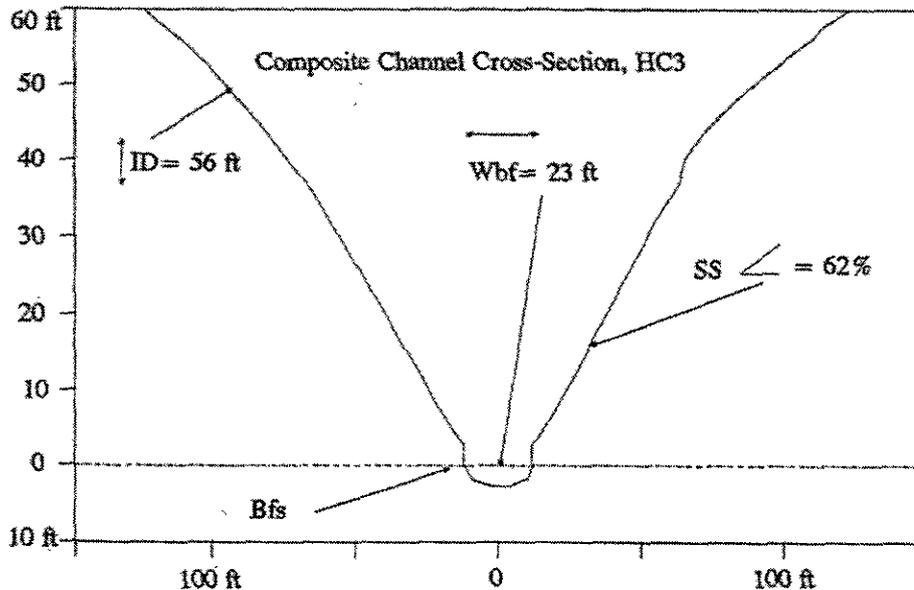
Geographic Setting: The HC3 channels are found in steep sided, narrow, V-shaped valleys. Adjacent landforms are usually snow avalanche slopes or mountainslopes. HC3 channel types are typically upper valley tributaries. Valley sideslopes often extend immediately to the stream's edge, but can be separated by short, steep, upper bank sideslopes. Flow containment is excellent, due to the deep incision and close proximity of valley sideslopes. Cascades, low vertical falls, and bedrock knickpoints are common features.

The HC3 streams can also be found in association with broken hilly or rolling terrain. In these situations, the stream is straight, moderate to deeply incised, and directly controlled by steep hillslopes or bedrock fault lines.



Similar Channel Types: HC5, HC6

Channel Structure



- Stream Gradient:6-15%, mean = 10%
- Incision Depth: < 50 m (165 ft), mean = 17 m (56 ft)
- Bankfull Width: Variable, mean = 7 m (23ft)
- Dominant Substrate: Small cobble to bedrock
- Stream Bank Composition: Bedrock and cobble
- Sideslope Length: Mean = 21 m (69 ft)
- Sideslope Angle: Mean = 62% (32 degrees)
- Channel Pattern: Single, linear
- Drainage Basin Area: 2.6-13 km² (1-5mi²)

INCHANNEL PHOTO: HC3



Riparian Vegetation: The riparian plant communities are dominantly western hemlock series, and nonforested salmonberry and Sitka alder shrub communities.

Plant Association Series	% Cover
Western Hemlock	46%
Nonforest	16%
Sitka Spruce	13%
Western Hemlock-Alaska Cedar	12%
Western Hemlock-Red Cedar	5%
Mixed Conifer	4%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC3 channels are sediment transport systems. Steep mountainslopes may contribute significant amounts of sediment from mass wasting. Steep channel gradients and high stream power limit sediment storage, therefore, sediment is rapidly delivered to downstream channels. Stream flow responds quickly to intense rainfall events.

Aquatic Habitat Capability

Large Woody Debris	2100 ft ³ /1000 linear ft
Available Spawning Area (ASA)	Insufficient data
Available Rearing Area (ARA)	Insufficient data

HIGH GRADIENT CONTAINED PROCESS GROUP

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	LOW	LOW
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye.....	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	LOW	MOD
Steelhead.....	NEG	NEG

Due to high stream flow velocity, HC3 channels are generally not accessible to anadromous species. These channels contain very little spawning habitat for anadromous fish species, and, where accessible, minimal rearing habitat. Resident Dolly Varden char inhabit these streams to some extent. HC3 channels typically affect downstream anadromous fish habitat through transport of sediment, large woody debris, nutrients, and aquatic insects.

Riparian Management Considerations

Concern for Management of:

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

Maintenance of inchannel large woody debris to trap sediments is a moderate riparian management concern (BMP 12.6).

These channels have moderate stream bank sensitivity, due to reaches with unconsolidated alluvium. Measures to protect stream bank sensitivity should be incorporated into riparian timber harvest prescriptions (BMPs 13.16, 13.9).

Steep sideslopes are also frequently associated with the more deeply incised channel segments, therefore, road construction and timber yarding activities on these channels may pose a risk for mass erosion (BMPs 13.5, 13.9, 13.16, 14.2, 14.3, 14.7-14.9).

High sediment bed loads and debris loads transported by these streams present a significant risk to stream crossing structures and downstream fish habitat (BMPs 14.7, 14.20).

These are classified as Value Class II or III streams. A minimum 100 foot timber harvest buffer is occasionally required where significant resident fish populations occur (Tongass Timber Reform Act, 1991).

If stream harvest buffers are not required (Class III channels), harvest unit design should account for water quality protection requirements for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

Sport Fish Potential.....Low

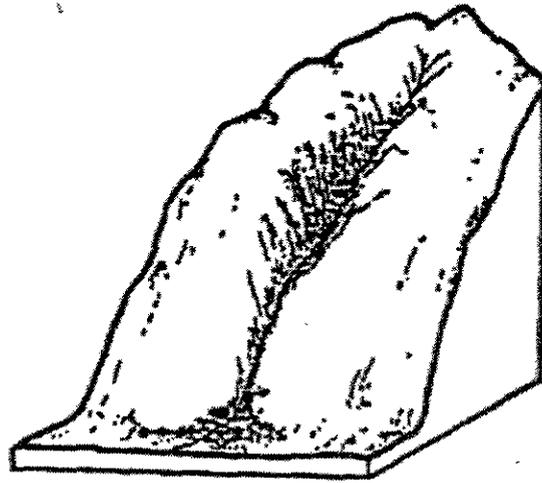
Enhancement OpportunitiesLarge Wood Placement

Placement of large wood structures can provide pools for Dolly Varden rearing, and increase ASA.

DEEPLY INCISED MUSKEG CHANNEL
 Channel Mapping Symbol: HC4 (Formerly A5)

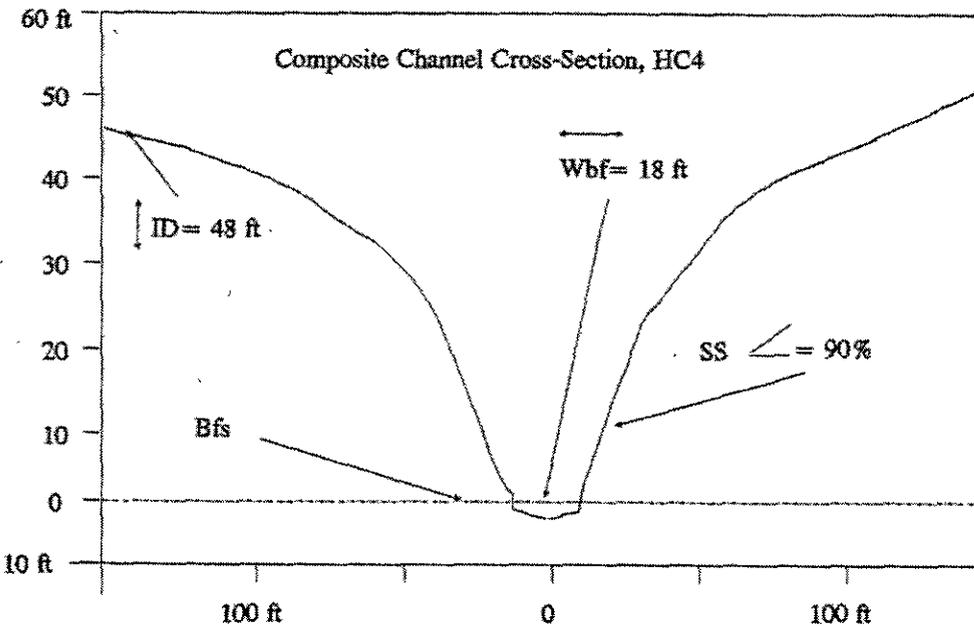
PHYSICAL CHARACTERISTICS

Geographic Setting: HC4 streams are restricted to hill, lowland, and, occasionally, broken mountainslope landforms. These channels are generally situated along wide valley footslopes or lowlands with undulating terrain dominated by muskegs. HC4 streams may also occur on muskeg plateaus and benchlands. Overall regional landscape slope is less than 60 percent. The HC4 channel type consists of steep, linear streams, deeply incised into hill and lowland muskeg landscapes. Deeply incised HC6 channels draining steep mountainslopes often change into HC4 channel types upon entering sloping, lowland landforms. Flow containment is excellent, due to bedrock control and long, steep sideslopes (6-20 m [20-66 ft]).



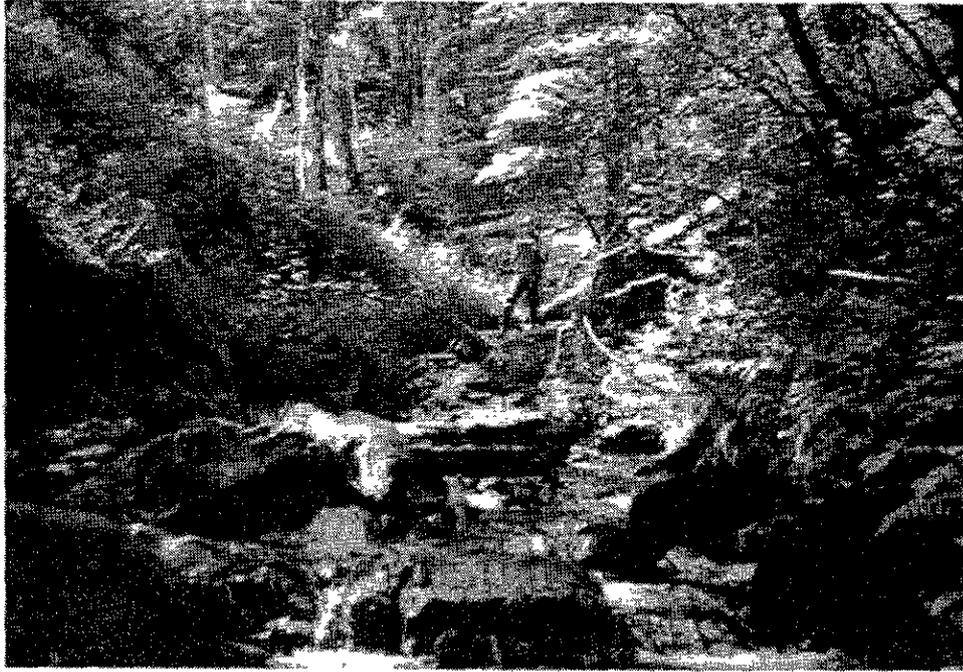
Similar Channel Types: HC3, HC6

Channel Structure



- Stream Gradient: > 6%, mean = 9%
- Incision Depth: 6-20 m (20-66 ft), mean = 14.5 m (48 ft)
- Bankfull Width: 4-15 m (13-50 ft), mean = 5.4 m (18 ft)
- Dominant Substrate: Small cobble to bedrock
- Stream Bank Composition: Bedrock
- Sideslope Length: 6-20 m (20-66 ft), mean = 8.3 m (27.5 ft)
- Sideslope Angle: Mean = 90% (42 degrees)
- Channel Pattern: Single, linear
- Drainage Basin Area: < 2.6 km² (< 1 mi²)

INCHANNEL PHOTO: HC4



Riparian Vegetation: The riparian plant communities are dominantly mixed conifer series. Other common riparian plant communities include shore pine, nonforested, and western hemlock/blueberry series.

Plant Association Series	% Cover
Mixed Conifer	40%
Shore Pine	15%
Nonforest	12%
Western Hemlock	10%
Western Hemlock-Red Cedar	10%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC4 channels function as rapid sediment transport systems. Mass wasting and hillslope processes occurring in headwater areas produce the sediment and debris that is quickly transported downstream. These are high energy channels that are often scoured to bedrock. Stream flow responses to intense rainfall or rain on snow events are usually rapid.

Aquatic Habitat Capability

Large Woody DebrisInsufficient data
 Available Spawning Area (ASA).....Insufficient data
 Available Rearing Area (ARA).....Insufficient data

HIGH GRADIENT CONTAINED PROCESS GROUP

Indicator Species Ratings

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

Fish access to HC4 channels is limited due to high stream flow velocities and numerous barriers. These channels may get occasional use by anadromous species at their confluence with accessible channels. Limited spawning and rearing areas are used primarily by resident Dolly Varden. The general lack of overwintering habitat limits the rearing potential in HC4 channels. Due to their location at source areas within watersheds, these channels can affect downstream anadromous fish habitat through their transport of sediment, large woody debris, nutrients, and aquatic insects.

Riparian Management Considerations

Concern for Management of:

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

Sideslope erosion is likely to be a concern along some HC4 channel segments where weathered bedrock or unconsolidated glacial or volcanic parent materials are found on steep sideslopes. Mass wasting of shallow, somewhat poorly drained soils, contributes to relatively high woody debris loading in HC4 channels. Timber yarding and road construction activity can affect sideslope stability and impact downstream water quality if BMPs are not followed (BMPs 13.5, 13.9, 13.16, 14.2, 14.3, 14.7, 14.17).

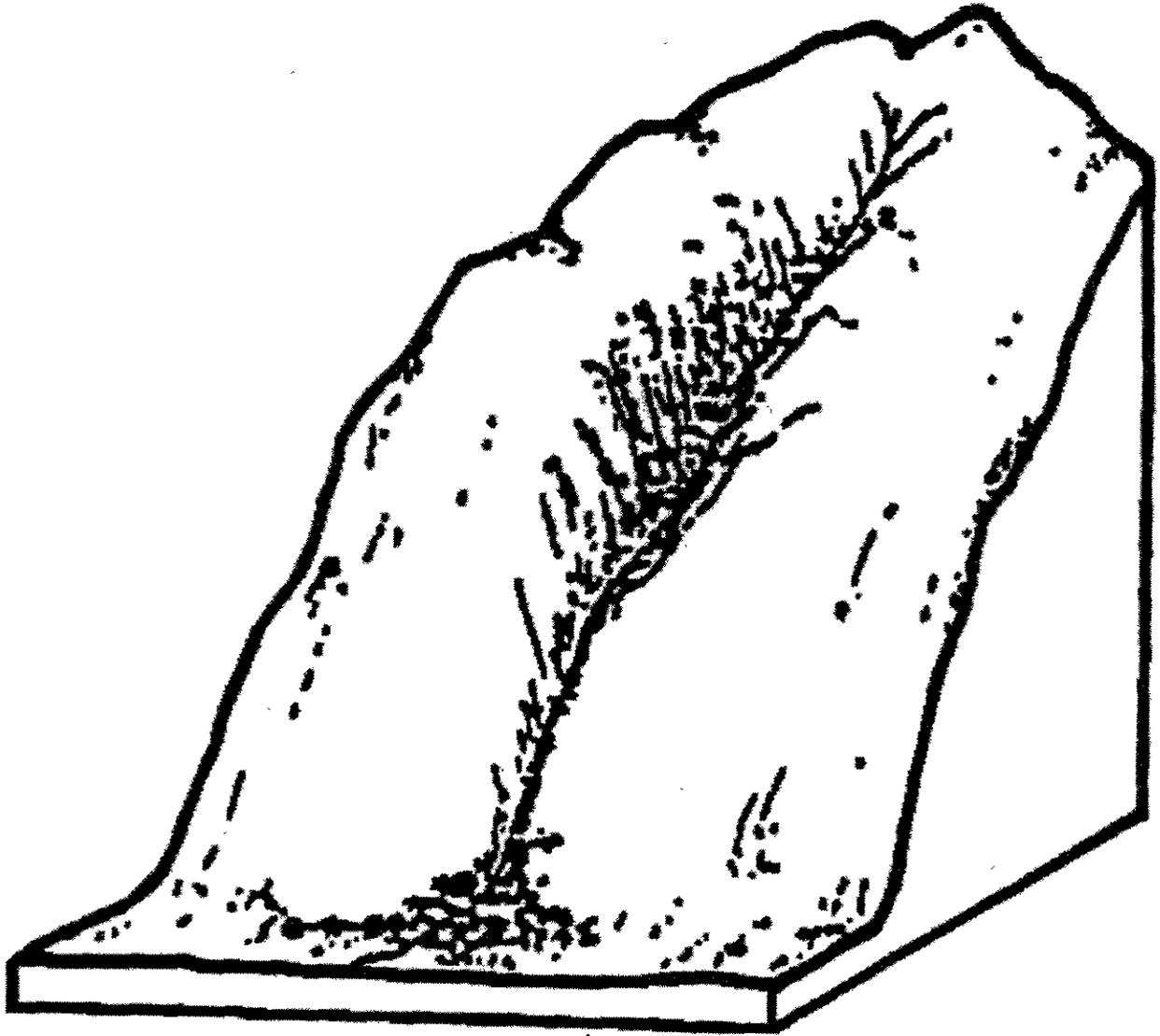
High bed load and debris loads carried by these streams present a risk to stream crossing structures (BMPs 14.17, 14.20).

These are classified as Value Class II or III streams. A minimum 100 foot timber harvest buffer is occasionally required where significant resident fish populations occur (Tongass Timber Reform Act, 1991). If stream harvest buffers are not required (Class III channels), harvest unit design should account for water quality protection requirements for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

Sport Fish Potential	LOW
Enhancement Opportunities	N/A

High Gradient Contained Process Group

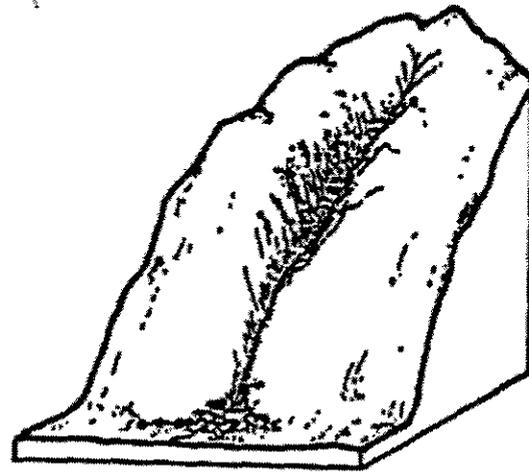


SHALLOWLY INCISED VERY HIGH GRADIENT CHANNEL

Channel Mapping Symbol: HC5 (Formerly A4)

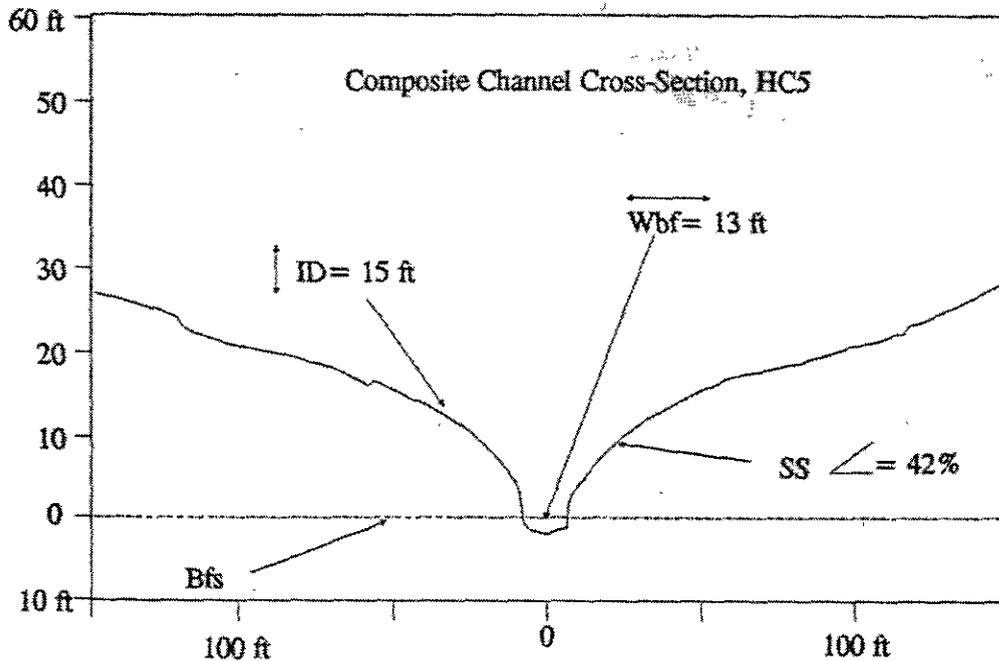
PHYSICAL CHARACTERISTICS

Geographic Setting: HC5 streams occur in upper headwater regions of glacially scoured valleys. They are generally found in alpine, snow avalanche, and subalpine mountain landforms. The HC5 stream is occasionally found on hilly and sloping lowland landforms. They are most often an outlet channel to alpine lakes, cirque basins, or hanging valleys. They can extend from the cirque basin through high relief alpine or subalpine sideslopes directly to the main valley floor. The HC5 channel types are shallow to moderately incised, very high gradient, mountainslope streams. Channel gradient is highly variable in this channel type, due to the frequent occurrence of falls and cascades. Channel pattern is linear and single, with bedrock control predominating.

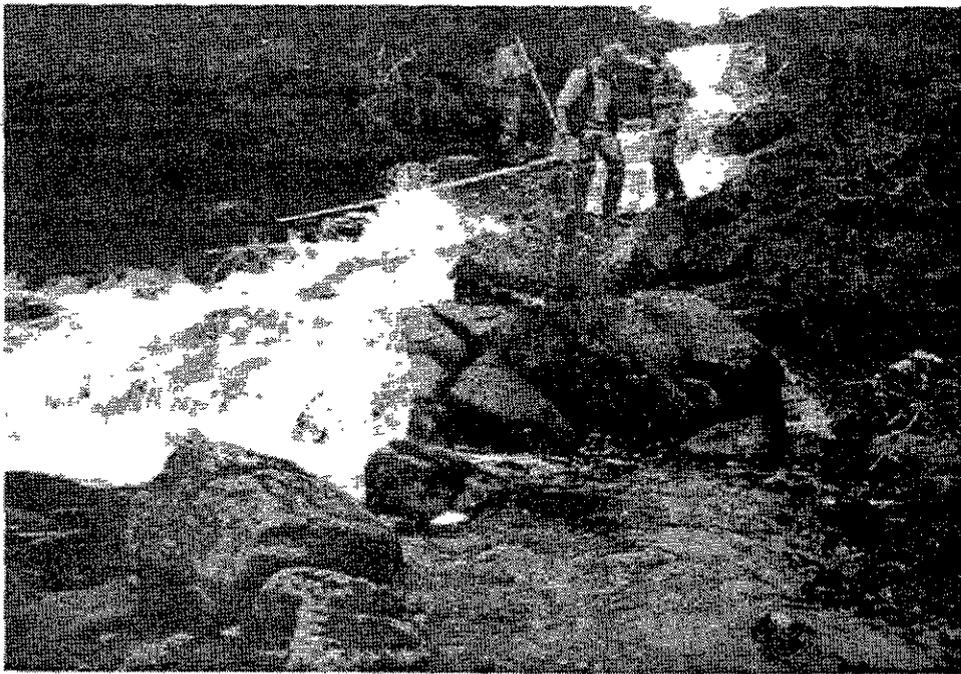


Similar Channel Types: HC5 streams are usually tributary to HC4, AF2, MM2 or MC1 streams. In very recently deglaciated, steep sided valleys, HC5 streams can be direct tributaries to main trunk flood plain channels.

Channel Structure



INCHANNEL PHOTO: HC5



Stream Gradient: > or = 15%, mean = 28%
 Incision Depth: < 10 m (< 33 ft), mean = 4.5 m (15 ft)
 Bankfull Width: Variable, mean = 4 m (13 ft)
 Dominant Substrate: Large rubble to bedrock
 Stream Bank Composition: Bedrock
 Sideslope Length: < 10 m (< 33 ft), mean = 7.5 m (25 ft)
 Sideslope Angle: Mean = 42% (23 degrees)
 Channel Pattern: Single, linear
 Drainage Basin Area: < 2.6 km² (< 1 mi²)

Riparian Vegetation: The riparian plant communities are variable with western hemlock series, Sitka spruce series, and mixed conifer series being the most dominant. Nonforested species are also quite common, representing 16 percent of the riparian vegetation cover.

Plant Association Series	% Cover
Western Hemlock	26%
Sitka Spruce	21%
Mixed Conifer	18%
Nonforest	16%
Western Hemlock-Alaska Cedar	7%
Mountain Hemlock	6%
Western Hemlock-Red Cedar	6%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC5 channels function as sediment transport systems. Surface erosion and hillslope mass wasting are the principal sources of stream sediment load. Stream flow responds quickly to intense rainfall and rain on snow events.

Aquatic Habitat Capability

Large Woody Debris2700 ft³/1000 linear ft
 Available Spawning Area (ASA)NEG
 Available Rearing Area (ARA)NEG

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	NEG	NEG
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye.....	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	NEG	NEG
Steelhead.....	NEG	NEG

Fish access to these channels is prevented by high velocity stream flows and barriers. No significant fish habitat occurs within these channels. However, if resident fish populations (e.g. grayling or rainbow trout) are present in the associated alpine lakes, the confluence of the stream and lake may be used for spawning. Typically, HC5 channels affect downstream anadromous fish habitat through transport of sediment, large woody debris, nutrients, and aquatic insects.

Riparian Management Considerations

Concern for Management of:

Large Woody DebrisLOW
 Sediment RetentionLOW
 Stream Bank SensitivityLOW
 Sideslope SensitivityMOD
 Flood Plain Protection.....N/A
 Culvert Fish Passage.....N/A

The significant amount of bedrock influence makes HC5 channels fairly stable. However, the unstable shallow soils on steep channel sideslopes present a high risk for mass erosion when disturbed by road construction or timber harvesting (BMPs 13.5, 14.2, 14.3).

These are classified as Value Class III streams. Timber harvest unit design should incorporate water quality protection needs for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

Sport Fish PotentialLOW
 Enhancement OpportunitiesN/A

LANDSCAPE PHOTO: HC5

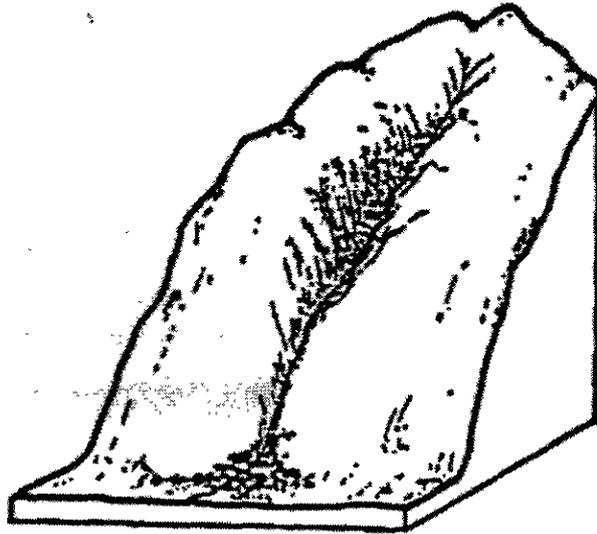


DEEPLY INCISED MOUNTAIN SLOPE CHANNEL

Channel Mapping Symbol: HC6 (Formerly A1)

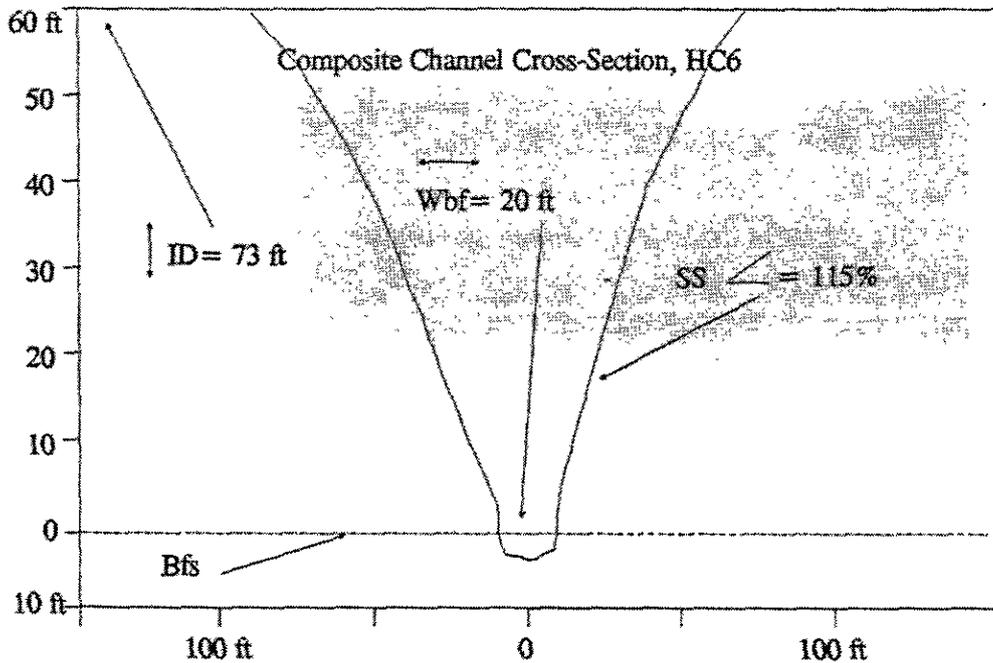
PHYSICAL CHARACTERISTICS

Geographic Setting: HC6 channels are most commonly found on mountainslope or hill landforms. They occur in large ravines, with a consistent sideslope length greater than 10 meters (33 feet). They usually initiate as first order streams and commonly extend to ridgetops and summits. HC6 channels can extend from the alpine zone to the footslope or valley floor landforms. Snow avalanche chutes may be associated with HC6 streams. On steep mountainslopes along inlets and straits, channels flow directly into saltwater.



Similar Channel Types: HC3, HC4, HC5

Channel Structure



- Channel Gradient: > 15%, mean = 27%
- Incision Depth: Mean = 22 m (73 ft)
- Bankfull Channel Width: < or = 15 m (50 ft), mean = 6 m (20 ft)
- Dominant Substrate: Bedrock, boulders, and cobble
- Stream Bank Composition: Bedrock
- Sideslope Length: > 10 m (> 33 ft), mean = 15 m (50 ft)
- Sideslope Angle: > 100%, mean = 115% (49 degrees)
- Channel Pattern: Single, linear
- Drainage Basin Area: < 2.6 km² (< 1 mi²)

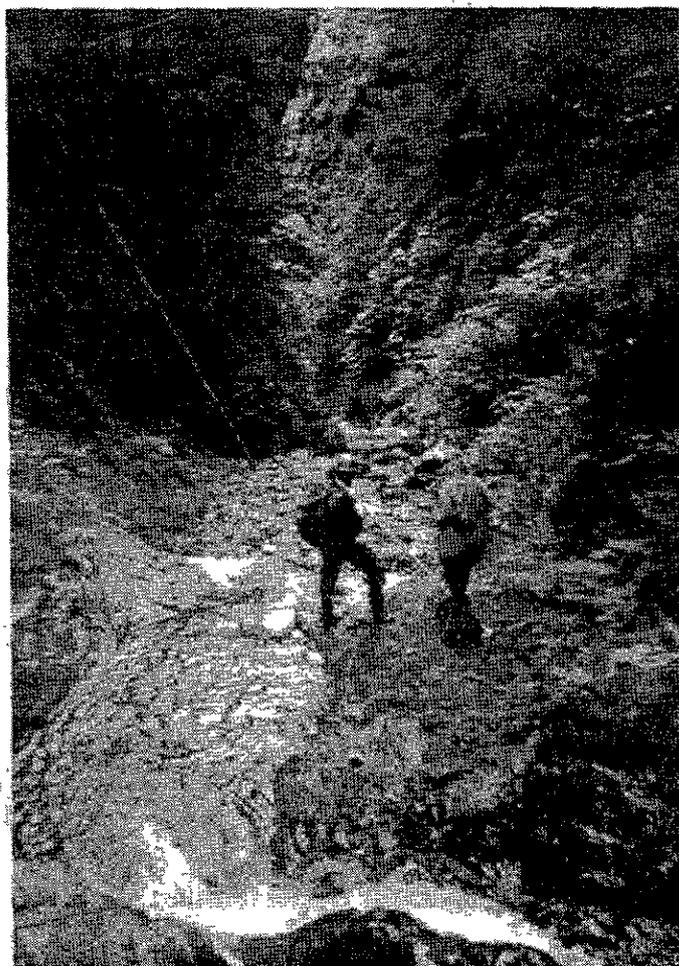
Riparian Vegetation: The riparian plant communities are dominated by the western hemlock series. Nonforested communities, which occur on disturbed channel sideslopes, are also common.

Plant Association Series	% Cover
Western Hemlock	41%
Nonforest	15%
Western Hemlock-Alaska Cedar.....	12%
Mixed Conifer	12%
Sitka Spruce.....	11%
Western Hemlock-Red Cedar	7%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC6 channels are primarily sediment transport systems. Channel sideslopes are often highly unstable, with a high sediment input potential. Landslides entering the channel may result in debris torrents that scour a significant length of stream. Steep channel gradients rapidly deliver sediment to downstream reaches. Stream flow responds quickly to intense rainfall events. Short term entrapment of minor volumes of sediment is provided by woody debris. These deposits rapidly become mobile during high flow events.



INCHANNEL PHOTO: HC6

Aquatic Habitat Capability

Large Woody Debris	4500 ft ³ /1000 linear ft
Available Spawning Area (ASA)	Insufficient data
Available Rearing Area (ARA)	Insufficient data

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	NEG	NEG
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden	NEG	NEG
Steelhead.....	NEG	NEG

HC6 channels are generally not accessible to anadromous or resident fish species because of high stream gradient, high flow velocity, seasonally low water, and migration barriers. These channels contain negligible spawning or rearing habitat.

Riparian Management Considerations

HIGH GRADIENT CONTAINED PROCESS GROUP

Concern for Management of:

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

Large woody debris is a relatively important factor controlling the routing of sediment through HC6 channels. Considerable inchannel storage of sediment occurs behind log steps and small debris jams, however, retention of fine sediment is low due to high stream flow energy. Woody debris recruitment mitigation measures may be necessary on a site specific basis. Excessive amounts of large woody debris in these channels can be a factor in the initiation of destructive debris torrents (BMP 12.6).

Sideslope sensitivity and erosion potential are high in HC6 channels due to over steepened slopes (BMPs 13.5, 13.9, 13.16, 14.2, 14.3, 14.7-14.9, 14.17). Stream bank and sideslope disturbance associated with road cuts and timber yarding may result in mass wasting and significant sediment delivery to downstream channels.

High bed load sediment and debris loads carried in these streams can pose a high risk to stream crossing structures and downstream fish habitat (BMPs 14.17, 14.20).

These are classified as Value Class III streams. Timber harvest unit design should incorporate water quality protection needs for these streams (BMPs 13.2, 13.3).

Riparian Management Opportunities:

Sport Fish Potential	N/A
Enhancement Opportunities	N/A

LANDSCAPE PHOTO: HC6



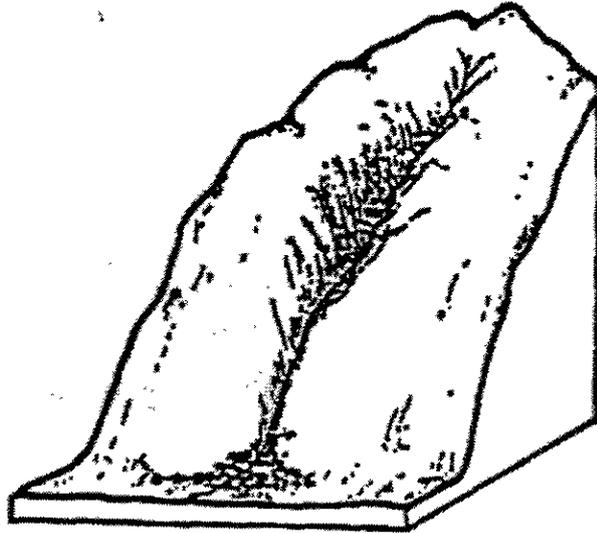
MODERATE/HIGH GRADIENT GLACIAL CASCADE CHANNEL

Channel Mapping Symbol: HC8 (Formerly D7)

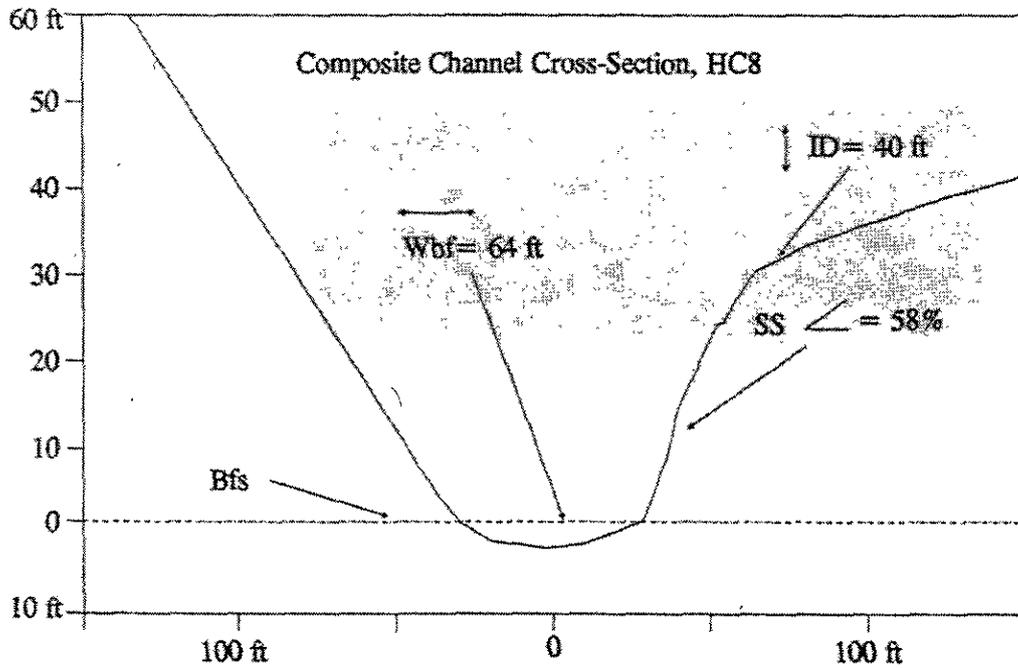
PHYSICAL CHARACTERISTICS

Geographic Setting: The HC8 channel is usually situated in a constricted valley bottom, with steep mountain or hillslope landforms immediately adjacent. These channels drain small valley glaciers.

Similar Channel Types: HC3, MC3, HC9



Channel Structure



- Stream Gradient:3-10%, mean = 7%
- Incision Depth:> 10 m (33 ft), mean = 12 m (40 ft)
- Bankfull Width:.....15-30 m (50-99 ft), mean = 19 m (64 ft)
- Dominant Substrate:Large cobble to bedrock
- Stream Bank Composition:Bedrock
- Sideslope Length:Highly variable
- Sideslope Angle:Variable, mean = 58% (30 degrees)
- Channel Pattern:.....Linear, single channel
- Drainage Basin Area:.....< 13 km² (<5 mi²)

INCHANNEL PHOTO: HC8

Riparian Vegetation: The riparian plant communities are dominated by the nonforested salmon-berry, willow, and Sitka alder shrub communities.

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

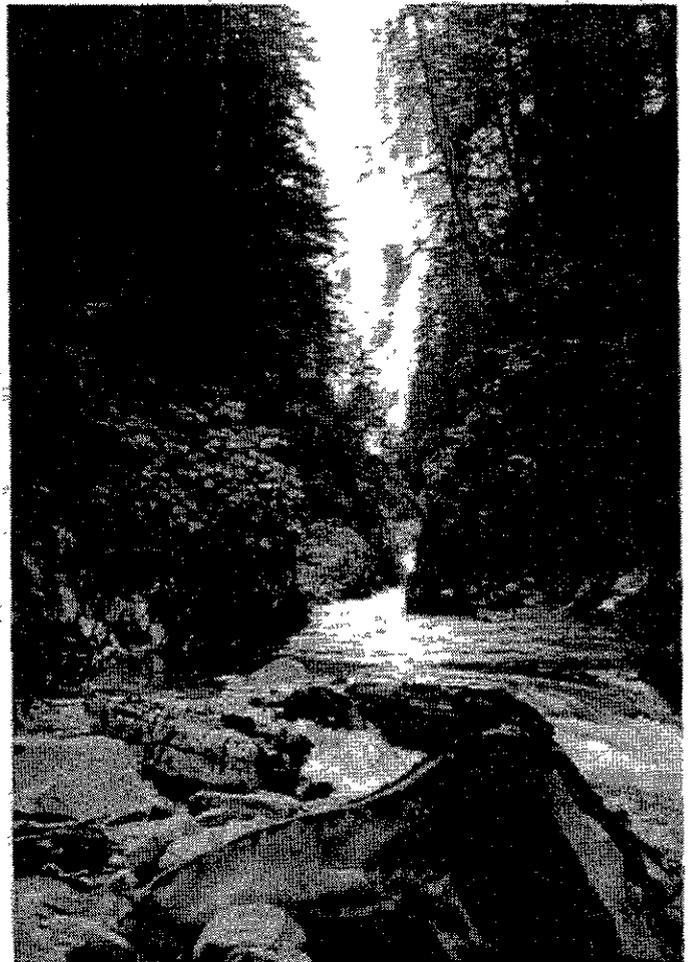
Hydrologic Function: Rapid sediment transport is typical of HC8 channels. Steep channel gradient, large diameter substrate, and well contained flows result in high stream power. A high glacial silt load is characteristic since glacial channels normally precede the HC8 in the watershed network. Sediment inputs from slope failures are moderately frequent. Bank stability is high due to bedrock composition, and inchannel sediment storage is minimal.

Aquatic Habitat Capability

Large Woody DebrisN/A
 Available Spawning Area (ASA)N/A
 Available Rearing Area (ARA)N/A

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	NEG	NEG
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye.....	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	NEG	NEG
Steelhead.....	NEG	NEG



These channels have restricted accessibility to anadromous species due to within segment and downstream barriers. They may get some use in lower gradient, downstream reaches by spawning chinook salmon, chum salmon, or Dolly Varden char which frequent associated glacial GO4 or GO2 channels. Spawning success is highly unlikely due to high velocities and high bedload movement. Rearing capability is also insignificant.

HIGH GRADIENT CONTAINED PROCESS GROUP

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

Sideslope sensitivity is the primary management concern associated with HC8 channel types. Steep sideslopes with shallow soils are sensitive to disturbance. Road construction can initiate sideslope mass wasting and deliver large quantities of sediment to the HC8 channels (BMPs 14.2, 14.3).

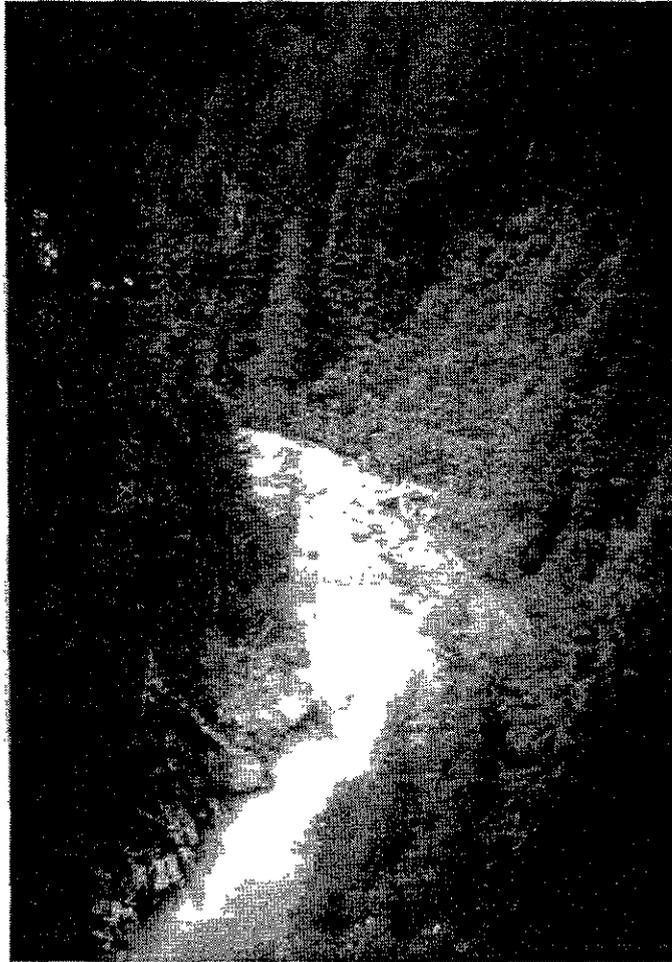
Stream crossings are generally not feasible, however, when they are, high bedload transport poses a significant risk to stream crossing structures (BMPs 14.17, 14.20).

These are typically classified as Value Class III streams.

Riparian Management Opportunities:

- Sport Fish Potential N/A
- Enhancement Opportunities N/A

LANDSCAPE PHOTO: HC8



HIGH GRADIENT INCISED GLACIAL TORRENT CHANNEL

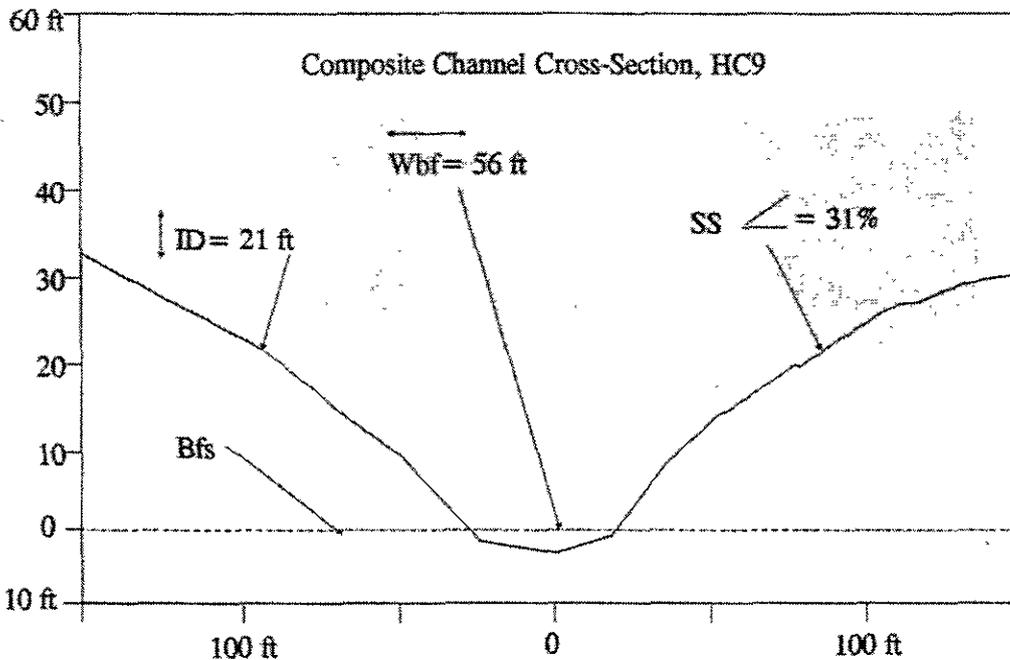
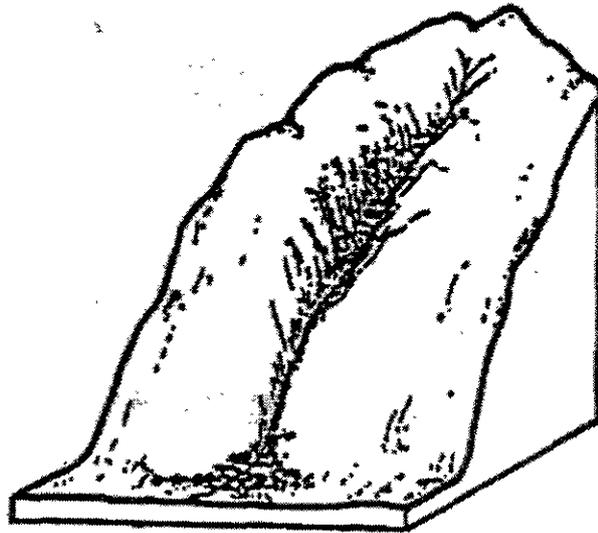
Channel Mapping Symbol: HC9 (Formerly D2)

PHYSICAL CHARACTERISTICS

Geographic Setting: The HC9 channel type occurs in upper watershed areas or on mountainslopes. The HC9 channel is a very high gradient channel emanating from the terminus of a steep valley glacier or perched alpine glacier. A high silt and sediment load is characteristic, and stream power is also quite high.

Similar Channel Types: HC8, HC6

Channel Structure



- Stream Gradient: > 6%, mean = 19%
- Incision Depth: Variable, < 15 m (50 ft), mean = 6.5 m (21 ft)
- Bankfull Width: Mean = 17 m (56 ft)
- Dominant Substrate: Large cobble to bedrock
- Stream Bank Composition: Bedrock
- Sideslope Length: < 20 m (> 66ft), mean = 18 m (58 ft)
- Sideslope Angle: Mean = 31% (17 degrees)
- Channel Pattern: Single, linear channel
- Drainage Basin Area: < 13 km² (< 5 mi²)

INCHANNEL PHOTO: HC9



Riparian Vegetation: The riparian plant communities are dominated by nonforested Sitka alder and willow shrub communities. The mountain hemlock series is also significant.

Plant Association Series	% Cover
Nonforest	62%
Mountain Hemlock.....	24%
Sitka Spruce-Cottonwood.....	8%
Western Hemlock	3%

Channel Type Phases: N/A

MANAGEMENT CONSIDERATIONS

Hydrologic Function: HC9 channels function as sediment transport systems. High channel gradient, large size substrate material, and well contained flows result in high stream power. Stream flows are largely derived from snow and glacier melt, and carry a high glacial silt load. Peak flows occur during the spring/summer melt season and again in the heavy rainfall season.

Aquatic Habitat Capability

Large Woody DebrisInsufficient data
 Available Spawning Area (ASA).....Insufficient data
 Available Rearing Area (ARA).....Insufficient data

HIGH GRADIENT CONTAINED PROCESS GROUP

Indicator Species Ratings

MIS	ASA	ARA
Coho.....	NEG	NEG
Pink.....	NEG	NEG
Chum.....	NEG	NEG
Sockeye.....	NEG	NEG
Chinook.....	NEG	NEG
Dolly Varden.....	NEG	NEG
Steelhead.....	NEG	NEG

These channels are almost entirely inaccessible to anadromous and resident species due to high streamflow velocities and the presence of numerous local and downstream barriers.

Riparian Management Considerations

Concern for Management of:

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

Stream bank and sideslope sensitivity are moderate for HC9 stream segments. Sideslope mass wasting of glacial fill or shallow soils can contribute to sediment loads in HC9 channels, however, sediment contributions from glacial meltwater tend to greatly overshadow inchannel sediment sources.

High bedload sediment transport poses a significant risk to stream crossing structures (BMPs 14.17, 14.20).

These are classified as Value Class III streams.

Riparian Management Opportunities:

Sport Fish Potential.....	N/A
Enhancement Opportunities	N/A