ADDENDUM B **06/16/07**

SKAGIT
DRAINAGE AND FISH INITIATIVE

DRAINAGE MAINTENANCE PLAN

By and Between the

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
and
SKAGIT COUNTY DIKING DISTRICT #3

A. DRAINAGE DISTRICT OVERVIEW

A1. LOCATION

Skagit County Diking District #3, hereafter referred to as DD #3, is located within the Skagit River Delta of Skagit County south of the City of Mount Vernon and north of the Town of Stanwood (Figure 1).

A2. BOUNDARIES

The jurisdictional boundaries of DD #3 are illustrated in Figure 2. DD #3 is bordered by the City of Mount Vernon to the north, the South Fork Skagit River to the west, the Skagit/Snohomish County line to the south, and Hill Ditch to the east. DD #3 encompasses the same geographic area as Skagit County Drainage and Irrigation Improvement District #17 (DID #17). Within the shared jurisdictional boundaries of DD #3 and DID #17, DD #3 is primarily responsible for dike maintenance and flood protection. In addition, DD #3 is also responsible for maintaining the drainage and drainage infrastructure in Hill Ditch.

A3. AREA

DD #3 encompasses approximately 4537acres within its jurisdictional boundaries (Figure 2).

A4. PREDOMINANT LAND USES

U.S. Interstate 5 (I-5) bisects DD #3 geographically through the middle in a north to south direction. Land use along the I-5 corridor from the northern boundary of DD #3 to approximately Hickox Road is dominated by commercial development. With the exception of residential and commercial land uses associated with the Town of Conway and the Conway/I-5 interchange, land use for the remainder of DD #3 is predominantly agriculture.

A5. WATERCOURSE CLASSIFICATIONS

The watercourse classifications used in this drainage maintenance plan are defined in Part III-(A) of the Drainage Maintenance Agreement. An 1887 U.S. Coast and Geodetic Survey Map (Figure 3) was used to determine the extent of the Managed Watercourses With Headwaters (green) and Managed Watercourses Without Headwaters (magenta) in DD #3. As noted above in Section A2, DD #3 shares the same geographic area as DID #17 and is primarily responsible

for dike maintenance and flood protection. However, in addition to dike and flood protection responsibilities, DD #3 is also responsible for maintaining the drainage infrastructure in Hill Ditch and its one associated artificial watercourse. Maintenance of the drainage infrastructure in the remaining watercourses within the shared jurisdictional boundaries of DD #3 and DID #17 is the responsibility of DID #17 and is covered in a separate Drainage Maintenance Plan. Though Hill Ditch is often referred to as Carpenter Creek, for the purposes of the district's Drainage Maintenance Plan, Hill Ditch begins at Cascade Ridge Drive to the north and ends at Fisher Slough to the south. Hill Ditch is classified as a Managed Watercourse With Headwaters (green) and is illustrated in Figure 2. The tributary streams to Hill Ditch (Carpenter Creek, Sandy Creek, Johnson Creek, Bulson Creek, Little Fisher Creek, Fisher Creek) that are outside of the district's jurisdictional boundaries are not covered by the district's Drainage Maintenance Plan.

In total, DD #3 includes approximately 6.37 miles of watercourses covered by this agreement. These include the following classifications:
Artificial Watercourses (yellow): 5068 feet, .96 miles.
Managed Watercourses Without Headwaters (magenta): 0 feet, 0 miles.
Managed Watercourse With Headwaters (green): 28557 feet, 5.41 miles.
Natural Watercourses (blue): 0 feet, 0 miles.

A6. DRAINAGE INFRASTRUCTURE

The drainage infrastructure in Hill Ditch and its associated artificial watercourse includes, culverts, bridges and floodgates (Figure 2). Hill Ditch and its one associated artificial watercourse include 6 culverts and 17 bridges (Table 1). It also includes two floodgate complexes and a screw gate flood bypass structure (Table 2).

TABLE 1. CULVERT INVENTORY - HILL DITCH – DD #3

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
326	OTH	CPC	NON				Carpenter Cr
331	OTH	CPC	NON				Carpenter Cr
332	OTH	CPC	NON				Carpenter Cr
333	OTH	CPC	NON	9.18	1.22		Carpenter Cr
334	OTH	CPC	NON				Carpenter Cr
335	OTH						Carpenter Cr
336	OTH						Carpenter Cr
338	OTH	WOOD	NON				Carpenter Cr
339	OTH	WOOD	NON				Carpenter Cr
341	OTH						Carpenter Cr
344	OTH						Carpenter Cr
345	OTH						Carpenter Cr
346	OTH						Carpenter Cr
347	OTH						Carpenter Cr

348	OTH						Carpenter Cr
349	OTH						Carpenter Cr
350	OTH						Carpenter Cr
351	RND	CST	NON	2.44	2.44	12.5	Carpenter Cr
375	RND	PCC	NON	0.91	0.91	22	unnamed
1626	RND	CST		0.48	0.48	6	unnamed
1627	RND	CST		0.48	0.48	6	unnamed
1628	RND	CST		0.78	0.78	21	unnamed
00	RND						Carpenter Creek

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

TABLE 3. FLOODGATE INVETORY – DD #3

Number	Type	Location	Description
26	Floodgates	Fisher Slough	3 10'X15' Floodgates
100	Floodgates	Fisher Slough	6 5'X 6' Floodgates
01	Screw Gate Bypass	Hill Ditch	

It is important to note that the majority of the drainage infrastructure within the jurisdictional boundaries of DD #3 is owned and maintained by Skagit County, Washington Department of Transportation, Burlington Northern Railroad and/or private landowners. DD #3 is only responsible for the maintenance of the two floodgate complexes (#26, #100) and the screw gate flood bypass structure (01) that is immediately upstream of the Fisher Creek confluence with Hill Ditch.

Flood Management

The channel containment dike along the right bank (west side) of Hill Ditch has been constructed to allow flood flows in Hill Ditch to overtop the dike at strategic locations and flood the adjacent agriculture land to the west and south. Figure 2a illustrates the locations along Hill Ditch where flood flows are allowed to overtop the containment dike. Typically, flood flows in Hill Ditch overtop the channel containment dikes between November and February. Ultimately the flood flows are captured by the artificial watercourses (yellow) of the flooded farmland, conveyed to Big Ditch and ultimately discharged into Skagit Bay. There are advantages and disadvantages for the agriculture community that result from floodwater inundating the farmlands adjacent to Hill Ditch. The` advantages of the floodwater include the enrichment of the farmland through the introduction of new sediments and nutrients. The primary disadvantage of the floodwater is that the soil is saturated for a longer period of time, which can result in a shorter growing season and/or a shorter harvest season. The saturated soil can also negatively impact winter cover crop production and winter livestock grazing. Residential septic systems in the flooded area can also be negatively impacted.

A7. DRAINAGE MAINTENANCE ACTIVITIES – DESCRIPTIONS

Trash Racks
The Hill Ditch drainage infrastructure does not include trash racks. DD #3 does not conduct trash rack maintenance.

Culverts
All of the culverts within the jurisdictional boundaries of DD #3 are owned and maintained by Skagit County and/or private landowners. DD #3 does not conduct culvert maintenance.

Flood Gates
Floodgates are one-way check valves that allow accumulated water to move from a field or secondary drainage system into a primary drainage system while preventing higher flows in the primary drainage system from back entering the secondary system. The maintenance of the floodgate includes removal of any lodged debris that may prevent the gate from closing properly and other normal maintenance necessary to insure the gates operate properly. Necessary repair and replacement is conducted as needed. DD #3 is responsible for maintaining the two floodgate complexes (26, 100) that are located in Hill Ditch.

Tide Gates
The Hill Ditch drainage infrastructure does not include tide gates. DD #3 does not conduct tide gate maintenance.

Channel In-Water Bucket Mowing
Channel in-water bucket mowing is a technique using a hydraulically operated sickle bar mower that is mounted on the front edge of a dredging bucket. The machine mows vegetative material below the water line and accumulates the material in the bucket. The material is then deposited away from the watercourse. This type of mowing allows for the removal of the above ground vegetative material while not removing the root system or soil. The hydraulically operated sickle bar mower is a very specialized piece of equipment. There is only one sickle bar mower in Skagit County, which is currently owned by Drainage and Irrigation Improvement District #19 (DID #19). Consequently, channel in-water bucket mowing by DD #3 in Hill Ditch is unlikely until additional sickle bar mowers become available.

Channel Out of Water Mowing
Channel out of water mowing is routine removal of vegetative material above the water line to the bank top. It is completed using various types of mechanical mowers (rotary or flail designs) and reduces the vegetative material during the growing cycle.

Dredging
Dredging is completed, as needed typically utilizing a hydraulically operated boom type excavator. The excavator has a wide flat bottomed bucket that scraped down one side, rounds the bottom and come up opposite side of the channel in one continuous motion. The excavation

leaves the watercourse with inclined sides and a rounded bottom that minimizes side sloughing and erosion. All the material removed from the channel is deposited landward of the watercourse and is later incorporated into the adjoining field or hauled away as necessary. When maintenance dredging is necessary in a watercourse too wide for the reach of the boom type excavator, a dragline type excavator is utilized. The excavation process is the same as the boom type excavator except that the dragline works from the middle of the channel back to each side.

Bridges
All of the bridges over Hill Ditch are owned and maintained by Skagit County, Washington Department of Transportation, Burlington Northern Railroad and/or private landowners. DD #3 does not conduct bridge maintenance.

Screw Gate Flood By Pass
The screw gate flood pass structure in Hill Ditch includes a concrete diversion dam in combination with a screw gate that allows the district to redirect flood flows from Hill Ditch into Big Ditch. The maintenance of the screw gate flood bypass structure includes removal of any lodged debris that may prevent the gate from closing properly and other normal maintenance necessary to insure the gate operates properly.

A8. GENERAL FISH AND FISH HABITAT

For the purpose of this Drainage Maintenance Plan, the term "fish" includes all species of native cold-water fishes. However, particular emphasis is placed on the salmonid species, which are managed by WDFW as commercially and recreationally important species. These include Pink salmon, Chum salmon, Sockeye salmon, Coho salmon, Chinook salmon, Rainbow trout (including Steelhead), Cutthroat trout, and native char. Pink salmon, Chum salmon, Sockeye salmon, Coho salmon, and Chinook salmon are anadromous in that they return to freshwater habitats to spawn after spending the majority of their lives in salt-water habitats. Rainbow trout, Cutthroat trout, and native char can either be freshwater resident or anadromous.

A8-1. Fish Passage - General

Fish passage to and from the district's waterways is restricted by several features within the drainage infrastructure. A dike system protecting the district from flood and tidal flows generally blocks the passage of adult and juvenile fish. In those cases where waterways intersect the levee system, passage is restricted by a culvert fitted with some sort of tide regulating mechanism, a flood control structure, or is blocked entirely by the dike system. Either of these features strictly limits the access of fish to and from the system except in those instances where floodwaters top or breach the system.

In some cases waterways that intersect the dike system are fitted with pump stations that facilitate the export of water over and through the dike. These pump stations are often used as backup mechanisms to conventional gravity discharge so that heavy storm related flows can be managed more effectively. Adult and juvenile fish can be entrained into the pumps during their

downstream migration where they can be injured or killed. The majority of drainage pump facilities are associated with culvert/tide gate complexes through which upstream and downstream passage of adult and juvenile fish is possible, though limited.

The primary point of access for fish to and from the system is located at those intersections where the gravity flow drainage is managed by a culvert fitted with some sort of tide regulating feature. Though tide gates do not completely block the upstream passage of adult and juvenile fish, upstream passage is restricted to very narrow windows of the tide cycles during which the tide gate is open and the discharge velocity does not exceed the upstream swimming capabilities of the individual fish. The window for upstream passage is greater for adult fish than for juvenile fish because of their stronger swimming capabilities. Tide gates do not completely block the downstream passage of adult and juvenile fish though downstream passage is limited to the low tide cycles when the water surface elevation upstream of the tide gate is sufficiently greater than the water surface elevation downstream of the tide gate to create the head differential to open the tide gate.

A8-2. Fish Habitat Distribution - General

Watercourses With Headwaters (green) typically include suitable spawning, rearing and migration habitats for Coho salmon and Cutthroat trout. Spawning habitats typically occur in those reaches that have gradients between 1-3% and are fed by flowing water and a steady supply of suitable sediments. These reaches tend to be found at the junction between low gradient tidally influenced reaches and the steeper gradient headwater reaches of the system. Rearing habitats can be distributed throughout these watercourses but are primarily located where there is sufficient channel complexity, riparian canopy, water quality and invertebrate productivity (fish prey/forage). Though upstream and downstream fish migration typically occurs throughout these watercourses, both natural and manmade barriers can and do restrict or block fish passage.

Watercourses Without Headwaters (magenta) can provide suitable rearing habitat immediately upstream of the terminal culvert/tide gates for a variety of fish species that immigrate into the watercourse from the estuary to forage on available prey. The accessibility of this rearing habitat to fish depends on the type of tide gate present and the degree to which it allows upstream fish passage and the exchange of key habitat forming processes, such as hydrology and sediment. The suitability of this habitat for rearing depends largely on water quality and prey/forage production factors which in part is governed by the interaction of hydrology, sediment, woody debris, riparian processes and other natural forces. Spawning habitat is typically not present in this watercourse type.

Artificial Watercourses (yellow) are wholly manmade systems constructed to convey water from a local surface or subsurface area for the purpose of improving the soil conditions for agriculture. Typically these watercourses are seasonal and do not have the habitat characteristics or natural processes necessary to support the rearing and spawning requirements of native cold water fishes.

A8-3. Fish Distribution - General

Fish survey data is primarily available for only the headwater reaches of the *Managed Watercourses With Headwaters* (green) within the drainage districts. Very limited fish survey data is available for the lowland reaches of the *Managed Watercourses With Headwaters* (green) and for *Managed Watercourses Without Headwaters* (magenta). Fish survey data has not been collected for *Artificial Watercourses* (yellow).

Managed Watercourses With Headwaters (green) typically support reproducing populations of Coho salmon and Cutthroat trout. The reproducing populations of Cutthroat trout can be either anadromous or resident. Anadromous adult Coho and Cutthroat typically enter the lower reaches of the watercourse to begin their upstream migration to the spawning habitats in late fall. Spawning occurs in the upper reaches of the watercourse where suitable spawning substrate is present and accessible. Coho spawn in the late fall and Cutthroat spawn in early spring. Coho adults die after spawning whereas Cutthroat can survive to spawn in successive years. Anadromous adult Cutthroat that survive spawning out migrate the watercourse from mid to late spring. After hatching from gravel nests (redds), emerging juvenile Coho and Cutthroat will distribute themselves to suitable rearing habitats in the watercourse. Anadromous juvenile Coho and Cutthroat generally spend 22 to 18 months rearing in freshwater before migrating to the marine environment. Generally, juvenile anadromous Coho and Cutthroat are present in the accessible reaches of the watercourse throughout the year. Resident adult and juvenile Cutthroat are typically present in the upper reaches of the watercourses throughout the year. In addition to fish originating from this watercourse type, it is generally assumed that between February and July, fish from other watercourses may immigrate from the estuary into the lower reaches of the watercourse via the culvert/tide gates to forage on available prey. It is generally assumed that the upstream distribution and duration of residence for these immigrating fish is limited by water quality, prey availability and their physiological affinity for salt water. In addition to salmonid species, forage fish species such as surf smelt and sand lance also use the estuary habitats for rearing and could potentially immigrate into the lower reaches of the watercourse. Adult native char and cutthroat could also be expected to immigrate into the lower reaches of the watercourse in pursuit of juvenile salmon and forage fish species. Generally elevated water temperatures found in these low land systems have also led to colonization by exotic species of fish that prefer warmwater habitats. Surveys have identified Pumpkinseed, Crappie, and Smallmouth Bass, among others, as being year around residents in the lower reaches of these systems. Many of these warm water species are voracious predators and could be considered deleterious to salmonid productivity.

Managed Watercourses Without Headwaters (magenta) generally do not support resident populations of cold-water game fish. This is largely attributed to the presence of drainage infrastructure that limits the exchange of tidal hydrology and/or connection to riverine hydrology. It is generally assumed that between January and July, fish from other watercourses may immigrate from the estuary into the lower reaches of this watercourse type via the culvert/tide gates to forage on available prey. It is generally assumed that the upstream

distribution and duration of residence for these immigrating fish is limited by water quality, prey availability and their physiological affinity for salt water.

Artificial Watercourses (yellow) are manmade and designed to convey water from local surface and subsurface areas in order to improve the soil conditions for agriculture. These watercourses are typically dry in the summer. Water quality and quantity can negatively affect the suitability of the potential rearing habitat. The habitat characteristics and natural processes required by native cold water fish for rearing and spawning are not supported by these artificial watercourses. It is therefore assumed that the presence of native cold water fish is either very limited or absent in this watercourse type.

A8-4. Fish Survey Data - Diking District # 3

Though fish observations are limited in Hill Ditch, considerable fish survey data has been collected in the tributaries to Hill Ditch which include Carpenter Creek, Sandy Creek, Johnson Creek, Bulson Creek, Fisher Creek and Little Fisher Creek (Figure 4). Fish observations associated with the FishDist Data have only been made at three locations in Hill Ditch and its associated artificial watercourse. Fish observations made in the artificial watercourse at the north end of Hill Ditch (#6) indicate the presence of coho salmon and cutthroat trout. The fish data point #9, at the confluence of Sandy Creek, indicates the presence of juvenile Chinook salmon. Char was observed (#16) at the confluence of an unnamed creek in the vicinity of State Highway 534. Table 4 summarizes the fish survey data available in the Fish Dist Data for Hill Ditch, its associated artificial watercourse and its tributaries. The fish survey data indicates that cutthroat trout, steelhead (rainbow trout), char (bull trout), coho salmon, Chinook salmon and chum salmon are present in Hill Ditch and its tributaries.

Table 4. Diking District #3 – Fish Survey Data

Data No.	Watercourse	Fish Species	Observer	Observations
1	Unnamed	Cutthroat	JJ	1
2	Carpenter Creek	Steelhead	KB	1
3	Unnamed	Cutthroat	MO	1
4	Carpenter Creek	Coho/Cutthroat	KB	1
5	English Creek	Coho/Cutthroat	MO	1
6	Unnamed	Coho/Cutthroat	JJ	2
7	Unnamed	Coho/Cutthroat	JJ	2
8	Lake Ten	Eastern Brook/Cutthroat	DRH	1
9	Carpenter Creek	Chinook	DRH	1
10	Sandy Creek	Coho/Cutthroat	JJ	2
11	Johnson Creek	Coho	SGSDB	1
12	Johnson Creek	Cutthroat	JJ	1
13	Bulson Creek	Coho	SGSDB	1
14	Sixteen Lake	Rainbow Trout	JJ	1
15	Unnamed	Cutthroat	JJ	1
16	Carpenter	Char	SN	2
17	Unnamed	Coho	SGSDB	1
18	Unnamed	Coho/Cutthroat	MO	3
19	Unnamed	Coho/Cutthroat	MO	3

20	Unnamed	Coho/Cutthroat	MO	3
21	Unnamed	Coho/Cutthroat	MO	3
22	Unnamed	Coho/Cutthroat	BB	2
23	Unnamed	Coho/Cutthroat	JJ	2
24	Unnamed	Coho/Cutthroat	MO	3
25	Unnamed	Coho/Cutthroat	BB	2
26	Fisher Creek	Chum	SSC	1
27	Unnamed	Coho/Cutthroat	JJ	2
28	Unnamed	Coho/Cutthroat	JJ	2
29	Unnamed	Coho/Cutthroat	JJ	2
30	Starbird Creek	Coho	SGSDB	1
31	Unnamed	Coho/Cutthroat	MO	2
32	Unnamed	Coho/Cutthroat	BB	1
33	Unnamed	Coho/Cutthroat	JJ	2
34	Unnamed	Coho/Cutthroat	JJ	1
35	Unnamed	Unknown salmonid	MO	1
36	Unnamed	Coho/Cutthroat	JJ	2
37	Unnamed	Coho/Cutthroat	JJ	2
38	Fisher Creek	Steelhead	BB	2
39	Unnamed	Coho/Cutthroat	SGSDB	1
40	Unnamed	Coho	BB	1
41	Unnamed	Cutthroat	JJ	1

Table 4 Observation Key
1 = Presence/Migration 2 = Known Spawning 3 = Known Juvenile Rearing

In addition to the FishDist Data noted above, the SRSC trapped fish in Hill Ditch under the Interstate 5 bridge for several years in the early 1990s. The SCRS data base for Hill Ditch demonstrates that juvenile Chinook and coho are present in reaches 5 and 6. NEED TO ELABORATE THIS DATA COLLECTION?

A8-5. Fish Distribution – Diking District #3

DD #3 includes Hill Ditch, which has been identified as a Watercourse With Headwaters (green). Hill Ditch is a tributary to Fisher Slough, which in turn is a tributary to the South Fork Skagit River. Though fish observations are limited in Hill Ditch and its one associated artificial watercourse (#6, #9, #16), considerable fish survey data has been collected in its tributaries which include Carpenter Creek, Sandy Creek, Johnson Creek, Bulson Creek, Fisher Creek and Little Fisher Creek (Figure 4). The fish survey data indicates that cutthroat trout, steelhead (rainbow trout), native char (bull trout), coho salmon, Chinook salmons and chum salmon are present in Hill Ditch, its one associated artificial watercourse and its tributaries.

It is reasonable to assume that Hill Ditch and its tributaries support spawning populations of cutthroat trout, steelhead (rainbow trout), chum salmon and coho salmon. It is also reasonable to assume that successful Chinook salmon and native char (bull trout) spawning does not occur in Hill Ditch and its associated tributaries given where these species have been observed in the watershed and given that the spawning habitat is not typical of the spawning habitat preferred by Chinook salmon or native char (bull trout).

Hill Ditch and its tributaries are used by cutthroat trout, steelhead, native char (bull trout), coho salmon, Chinook salmons and chum salmon for migration and rearing. Though it is unlikely that Chinook salmon and native char (bull trout) spawn in Hill Ditch or its tributaries, it is reasonable to assume that juvenile Chinook salmon and native char (bull trout) from the South Fork Skagit River can immigrate into Hill Ditch and its tributaries to rear prior to migrating to Skagit Bay. The distribution and duration which fish rear in Hill Ditch and its associated tributaries may be effected by water quality, prey availability and their affinity for saltwater.

The fish use and fish passage barrier information presented in Figure 5 is from WDFW's Salmonscape database. The floodgate complex at the confluence of Hill Ditch and Fisher Slough (26) is identified in this database as a barrier to upstream fish passage. Floodgate complex (26) is a partial barrier to upstream passage of adult and juvenile fish. Given that the water elevation in Fisher Slough is tidally influenced, fish passage through the floodgates at complex 26 is typically restricted to narrow windows during which the river stage and/or tidal influence allows the floodgates to open and during which the discharge velocity does not exceed the upstream swimming capabilities of the individual fish. Generally between late May and late September, DD #3 locks the floodgates open allowing unimpeded water movement and passage of adult and juvenile fish.

A8-6. Fish Habitat Distribution – Hill Ditch - Diking District #3

Hill Ditch has been modified and simplified via historic dredging and diking activities. Large woody debris is absent. Though gravel substrate is present in Hill Ditch near the confluences of the tributary streams, the majority of the channel substrate is dominated by silts and fines. For its entire length, the right bank (west and north) is either the shoulder of Stockpole Road or an earthen containment dike and is completely dominated by reed canary grass. The left bank (east and south) is more varied. The majority of the left bank abuts a hillside to the east. The left bank downstream of U.S. Interstate 5 is a earthen containment dike. The riparian vegetation on the left bank is a mix of reed canary grass and mature deciduous trees and shrubs. There are both perennial freshwater inputs (Carpenter Creek, Sandy Creek, Bulson Creek and Fisher Creek) and seasonal freshwater inputs (Johnson Creek) into Hill Ditch. Despite these freshwater inputs, elevated water temperatures in Hill Ditch would be expected during the summer and early fall due to the limited riparian habitat. The habitat in Hill Ditch is described in more detail below in Section B1.

B. MANAGED WATERCOURSE WITH HEADWATERS

Hill Ditch is the only Watercourse With Headwaters (green) within the jurisdictional boundaries of DD #3 and is illustrated in Figure 2.

B1. REACH ASSESSMENTS – HILL DITCH

Hill Ditch was partitioned into 6 reaches (Figure 5) to facilitate the following detailed reach assessments.

REACH 1

Reach Description - Figure 6

Reach 1 begins just upstream of the Cascade Ridge Drive bridge (350) and extends downstream to the confluence of Hill Ditch with Sandy Creek (bridge 341).

Reach Length

Reach 1 is approximately .77 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 1 includes:

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
344	OTH						Carpenter Cr
345	OTH						Carpenter Cr
346	OTH						Carpenter Cr
347	OTH						Carpenter Cr
348	OTH						Carpenter Cr
349	OTH						Carpenter Cr
350	OTH						Carpenter Cr
351	RND	CST	NON	2.44	2.44	12.5	Carpenter Cr
1626	RND	CST		0.48	0.48	6	unnamed
1627	RND	CST		0.48	0.48	6	unnamed
1628	RND	CST		0.78	0.78	21	unnamed

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

The bridge and culvert infrastructure in Reach 1 is not owned or maintained by DD #3. Bridges 344 – 350 are owned and maintained by private landowners adjacent to Hill Ditch. Culverts 351, 1626, 1627, and 1628 are owned and maintained by Skagit County.

Reach Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in the immediate vicinity of the Carpenter Creek confluence as needed, after storm events deposit sufficient sediments from Carpenter Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 1 approximately every 10 years.

Channel Out of Water Mowing

DD #3 does not mow the channel banks along this reach. Reach 1 parallels and abuts the east side of Stackpole Road, which is owned and maintained by Skagit County. Skagit County annually mows the right bank of the channel that abuts Stackpole Road. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

DD #3 does not currently conduct channel in-water bucket mowing in Reach 1. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance

DD #3 does not conduct culvert maintenance. The culverts in this reach are owned and maintained by Skagit County.

Herbicide Spraying

Historically, DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

The bridges in Reach 1 are owned and maintained by private landowners. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

Beaver dams are removed as required.

Current Reach Habitat Conditions

The channel in Reach 1 has been modified and simplified via historic dredging activities. The channel in Reach 1 is parallel to and abuts the east side of Stackpole Road. The right bank (west) of the channel is confined by the roadbed fill of Stackpole Road whereas the left bank (east) of the channel is confined by the hillside to the east of Stackpole Road. Large woody debris is absent in this reach. Gravel dominates the channel substrate in the vicinity of the Carpenter Creek confluence and downstream of the confluence for approximately 1/3 of Reach 1. Silts and fines dominate the channel substrate in the lower 2/3 of Reach 1. Mature deciduous tree and shrub riparian cover is limited to approximately 50% of the left bank. Where the

deciduous riparian canopy is not present, reed canary grass dominates the shoreline vegetation. The right bank constitutes the shoulder of Stackpole road and is dominated by reed canary grass. There is a perennial source of water entering Reach 1 via Carpenter Creek. However, despite this freshwater input, elevated water temperatures in Reach 1 would be expected due to the limited riparian cover. Elevated water temperatures and reduced dissolved oxygen levels, especially during the summer and early fall, would be expected to limit the suitability of the channel habitat for juvenile fish rearing.

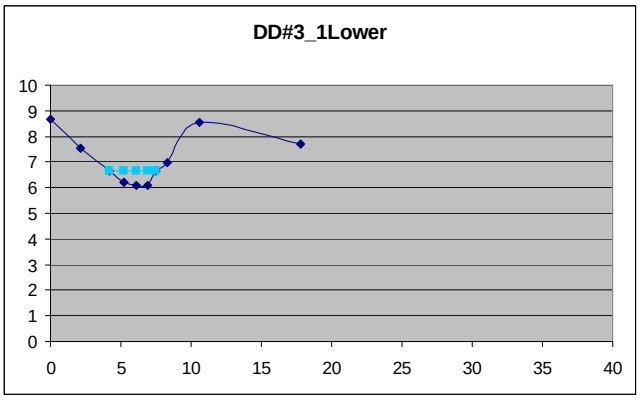
Riparian Characteristics
The right bank of Reach 1 constitutes the shoulder of Stackpole road and is dominated by reed canary grass. The left bank along the upper half of Reach 1 is dominated by reed canary grass. Mature deciduous trees and shrubs dominate the left bank along the lower half of Reach 1.

Fish Passage Barriers & Obstacles – Figure 6
The culvert under Cascade Ridge Drive (#351) may impede upstream fish passage into Carpenter Creek from Hill Ditch during high and low flow conditions. WDFW's SalmonScape database identifies this culvert as fish passage barrier (Figure 6). Adult and juvenile fish migration is not obstructed by the private bridge infrastructure present in Reach 1. Adult and juvenile migration may be periodically restricted by low flow conditions and poor water quality.

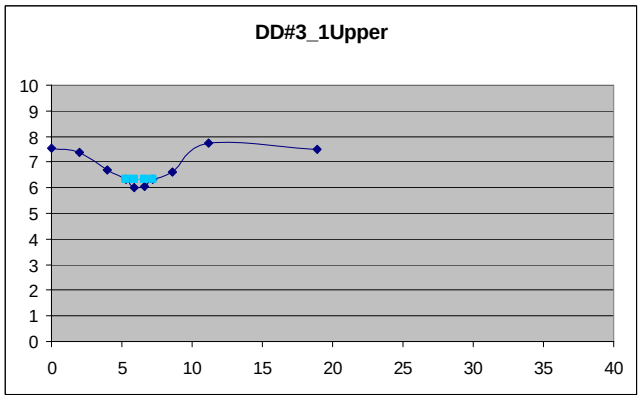
Spawning Habitat
WDFW's Salmonscape database identifies Reach 1 as spawning habitat (Figure 6). Based on the existing channel substrate conditions, spawning would be limited to the upper 1/3 of Reach 1 where appropriate spawning gravel substrate is present. Successful spawning in the lower 2/3 of Reach 1 is unlikely given the silts and fines that dominate the channel substrate.

Channel Cross Sections

Lower Reach



Upper Reach



Reach Fish Utilization – Figure 5

Fish data has not been specifically collected for Reach 1 of Hill Ditch. However, fish observations in the tributary streams to Reach 1 (Figure 4, Table 4, data points 1-7) indicate that coho salmon, cutthroat trout and steelhead trout (rainbow) are present in the headwater streams to Reach 1. It is reasonable to assume that where suitable spawning substrate is available in the upper 1/3 of Reach 1, coho salmon, steelhead and cutthroat trout could spawn. It is also reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, and juvenile steelhead could potentially rear throughout this reach though their distribution depends on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality. The culvert under Cascade Ridge Drive may impede upstream fish passage from Hill Ditch into Carpenter Creek during high and low flow conditions. The private bridges along Reach 1 do not obstruct adult and juvenile fish migration. Adult and juvenile fish migration in Reach 1 may be periodically restricted by low flow conditions and poor water quality.

As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. However, given that the spawning habitat in Reach 1is not typical of the spawning habitats preferred by Chinook salmon or bull trout, it is reasonable to assume that successful Chinook salmon and bull trout spawning does not occur in Reach 1. Given that the confluence of Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit Bay, it is possible that juvenile Chinook salmon and bull trout from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Enhance the riparian vegetation along the left bank.
- Protect the mature riparian vegetation along the left bank.
- Establish riparian test plots along the lower half of the Stackpole Road embankment (right bank) where willow and hardhack could be planted to control reed canary grass.

Reach Photographs – Figure 8

REACH 2

Reach Description - Figure 6

Reach 2 begins at the confluence of Hill Ditch with Sandy Creek (bridge 341) and extends downstream to the confluence of Hill Ditch with Johnson Creek immediately upstream of bridge #336.

Reach Length

Reach 2 is approximately 1.23 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 2 includes:

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
341	OTH						Carpenter Cr

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

Bridge 341 is owned and maintained by Skagit County.

Reach Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in the immediate vicinity of the Sandy Creek confluence, as needed, after storm events deposit sufficient sediments from Sandy Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 2 approximately every 10 years.

Channel Out of Water Mowing

DD #3 annually mows the right bank (earthen containment dike) of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

DD #3 does not currently conduct channel in-water bucket mowing in Reach 2. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance

There are no culverts in Reach 2.

Herbicide Spraying

Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

The bridge in Reach 2 is owned and maintained by Skagit County. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

Beaver dams are removed as required.

Current Reach Habitat Conditions

The channel in Reach 2 has been modified and simplified via historic maintenance dredging and diking activities. Immediately downstream of the confluence of Sandy Creek (bridge #341), Hill Ditch has been re-directed from a southerly course to the west via a 90-degree turn. For

approximately ¼ mile downstream of bridge #341, Reach 2 is maintained parallel to and abutting the south side of Stackpole Road. The right bank of the channel is confined by the roadbed fill of Stackpole Road whereas the left bank of the channel abuts a gently sloping pasture. The riparian vegetation along this section of Reach 2 is dominated by reed canary grass. Approximately ¼ mile downstream of bridge #341, Hill Ditch is forced from a westerly course back to the south via another 90 degree turn. Between Stackpole Road and the confluence of Johnson Creek, the right bank of Reach 2 is contained by an earthen dike dominated by reed canary grass. The left bank abuts the alluvial fan deposit of Sandy Creek, an extensive wetland and the alluvial fan deposit of Johnson Creek. Reed canary grass dominates the majority of the left bank with scattered mature deciduous vegetation limited to the channel section adjacent to the wetland. Large woody debris is absent in Reach 2. Though silts and fines dominate the channel substrate in Reach 2, gravels from Sandy Creek may provide suitable spawning habitat in the immediate vicinity of the Sandy Creek confluence. There is a perennial source of freshwater entering Reach 2 via Sandy Creek. There is also freshwater input from the wetland complex adjacent to Reach 2. Despite these freshwater inputs, elevated water temperatures in Reach 2 would be expected due to the limited riparian cover. Elevated water temperatures and reduced dissolved oxygen levels, especially during the summer and early fall, would be expected to limit the suitability of the habitat for juvenile rearing.

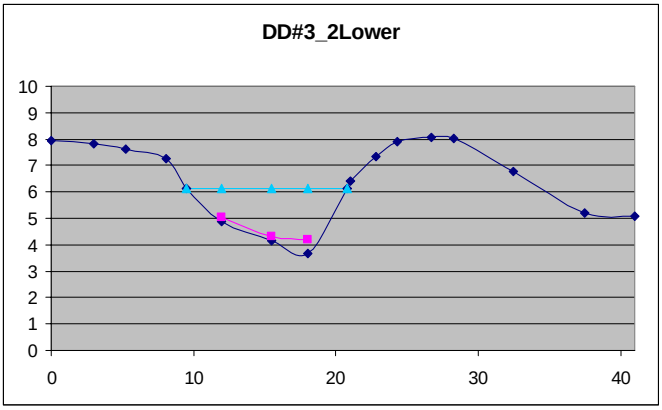
Riparian Characteristics
Downstream of bridge #341 for approximately ¼ mile, Reach 2 is maintained parallel to and abutting the south side of Stackpole Road. The right bank of the channel is confined by the roadbed fill of Stackpole Road whereas the left bank of the channel abuts pasture. The riparian vegetation along this section of Reach 2 is dominated by reed canary grass. Approximately ¼ mile downstream of bridge #341, Hill Ditch is forced from a westerly course back to the south via another 90 degree turn. The right bank of Hill Ditch in this section of Reach 2 is an earthen dike dominated by reed canary grass. The left bank abuts pastureland, an extensive wetland and the alluvial fan of Sandy Creek and Johnson Creek. Reed canary grass dominates the majority of the left bank with scattered mature deciduous vegetation limited to the channel section adjacent to the wetland in the middle part of the reach.

Fish Passage Barriers & Obstacles – Figure 5
There are no known fish passage barriers in Reach 2. However, low flow conditions and/or elevated water temperatures could limit fish migration in the summer and early fall.

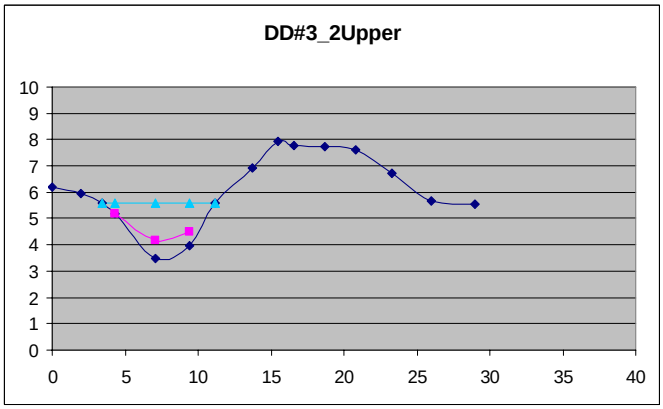
Spawning Habitat
Though silts and fines dominate the channel substrate in Reach 2, gravels from Sandy Creek may provide suitable spawning habitat in the immediate vicinity of the Sandy Creek confluence.

Channel Cross Sections

Lower Section



Upper Section



Reach Fish Utilization – Figure 5

Fish data has not been specifically collected for Reach 2 of Hill Ditch. However, fish observations in the tributary streams to Reach 1 and Reach 2 (Figure 4, Table 4, data points 1-10) indicate that coho salmon, Chinook salmon, cutthroat trout and steelhead (rainbow trout) may be present in Reach 2. It is reasonable to assume that where suitable spawning substrate is available in the vicinity of the Sandy Creek confluence, coho salmon, steelhead and cutthroat trout could spawn. It is also reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, and juvenile steelhead could potentially rear throughout this reach though their distribution depends on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality. Though there are no fish passage blockages in Reach 2, adult and juvenile fish migration may be periodically restricted by low flow conditions and poor water quality.

As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. Given that the spawning habitat in Reach 2 is not typical of the spawning habitats preferred by Chinook salmon or bull trout, it is reasonable to assume that successful Chinook salmon and bull trout spawning does not occur in Reach 2. However, given that the confluence of Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit Bay, it is possible that juvenile Chinook salmon and bull trout from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Realign Hill Ditch to a more natural configuration between the confluence of Sandy Creek and the wetland complex to the south.
- Realign Sandy Creek to a more natural configuration that restores the alluvial fan functions.

- Enhance the interconnections between Hill Ditch and the wetland complex that is between the alluvial fans of Sandy Creek and Johnson Creek.
- Realign Johnson Creek to a more natural configuration that restores the alluvial fan functions.

Reach Photographs – Figure 8

REACH 3

Reach Description - Figure 6

Reach 3 begins at the confluence of Johnson Creek (bridge 336) and extends downstream to the confluence of Bulson Creek (bridge 339).

Reach Length

Reach 3 is approximately .76 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 3 includes :

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
336	OTH						Carpenter Cr
338	OTH	WOOD	NON				Carpenter Cr
339	OTH	WOOD	NON				Carpenter Cr

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

The bridge infrastructure in Reach 3 is not owned or maintained by DD #3. Bridge 336 is owned and maintained by Skagit County. Bridges 338 and 339 are owned and maintained by private landowners adjacent to Hill Ditch.

Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in the immediate vicinity of the confluence of Johnson Creek, as needed, after storm events deposit sufficient sediments from Johnson Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 3 approximately every 10 years.

Channel Out of Water Mowing

DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing
DD #3 does not currently conduct channel in-water bucket mowing in Reach 3. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance
There are no culverts in Reach 3.

Herbicide Spraying
Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance
The bridges in Reach 3 are owned and maintained by Skagit County and private landowners. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal
Beaver dams are removed as required.

Current Reach Habitat Conditions
The channel in Reach 3 has been modified and simplified via historic maintenance dredging and diking activities. The right bank of Reach 3 is an earthen dike dominated by reed canary grass. The left bank along the upper 1/3 of Reach 3 abuts a forested hillside that supports mature deciduous and conifer trees. Where the channel migrates away from the forested hillside, the left bank between the channel and hillside is dominated by reed canary grass. The left bank along the lower 2/3 of Reach 3 abuts hobby farms and a dairy. The riparian vegetation along this section is dominated by reed canary grass. Large woody debris is absent in Reach 3. Though silts and fines dominate the channel substrate in Reach 3, gravels from Johnson Creek may provide suitable spawning habitat in the immediate vicinity of the Johnson Creek confluence. There is an intermittent source of water entering Reach 3 via Johnson Creek. Elevated water temperatures in Reach 3 would be expected due to the limited riparian cover. Elevated water temperatures and reduced dissolved oxygen levels, especially during the summer, would be expected to limit the suitability of the habitat for juvenile rearing.

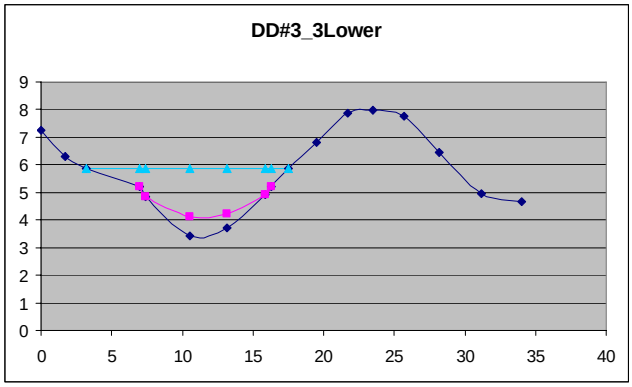
Riparian Characteristics
The right bank of Reach 3 is an earthen dike dominated by reed canary grass. The left bank along the upper 1/3 of Reach 3 abuts a forested hillside that supports mature deciduous and conifer trees. Where the channel migrates away from the forested hillside, the left bank between the channel and hillside is dominated by reed canary grass. The left bank along the lower 2/3 of Reach 3 abuts hobby farms and a dairy. The riparian vegetation along this section is dominated by reed canary grass.

Fish Passage Barriers & Obstacles – Figure 5
There are no known fish passage barriers in Reach 3. However, low flow conditions and/or elevated water temperatures could limit fish migration in the summer and early fall.

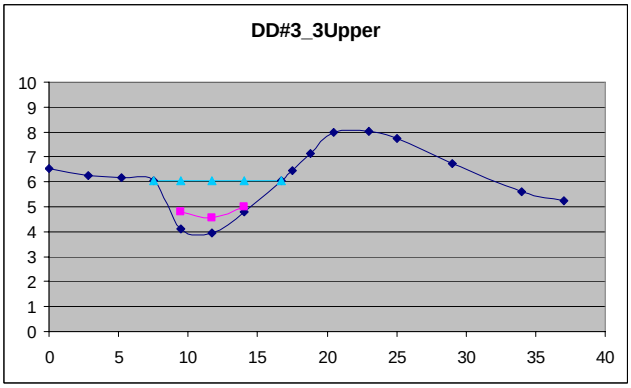
Spawning Habitat
Though silts and fines dominate the channel substrate in Reach 3, gravels from Johnson Creek may provide suitable spawning habitat in the immediate vicinity of the Johnson Creek confluence.

Channel Cross Sections

Lower Reach



Upper Reach



Reach Fish Utilization – Figure 5
Fish data has not been specifically collected for Reach 3 of Hill Ditch. However, fish observations in the tributary streams to Reach 1, Reach 2 and Reach 3 (Figure 4, Table 4, data points 1-12) indicate that coho salmon, Chinook salmon, cutthroat trout and steelhead (rainbow trout) may be present in Reach 3. It is reasonable to assume that where suitable spawning substrate is available in the vicinity of the Johnson Creek confluence, coho salmon, steelhead and cutthroat trout could spawn. It is also reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, and juvenile steelhead could potentially rear throughout this reach though their distribution depends on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality. Though there are no fish passage blockages in Reach 3, adult and juvenile fish migration may be periodically restricted by low flow conditions and poor water quality.

As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. Given that the spawning habitat in Reach 3 is not typical of the spawning habitats preferred by Chinook salmon or bull trout, it is reasonable to assume that successful Chinook salmon and bull trout spawning does not occur in Reach 3. However, given that the confluence of Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit

Bay, it is possible that juvenile Chinook salmon and bull trout from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Enhance the riparian habitat along the left bank (east) of Reach 3.
- Establish riparian test plots along the lower half of the earthen containment dike along the right bank with willow and hardhack to control reed canary grass.

Reach Photographs – Figure 8

REACH 4

Reach Description - Figure 6

Reach 4 begins at the confluence of Hill Ditch with Bulson Creek (bridge 339) and extends downstream to the State Route 534 bridge (326).

Reach Length

Reach 4 is approximately .58 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 4 includes :

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
326	OTH	CPC	NON				Carpenter Cr

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

Bridge 326 is owned and maintained by Skagit County.

Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in the immediate vicinity of the confluence of Bulson Creek, as needed, after storm events deposit sufficient sediments from Bulson Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 4 approximately every 10 years.

Channel Out of Water Mowing

DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing
DD #3 does not currently conduct channel in-water bucket mowing in Reach 4. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance
There are no culverts in Reach 4.

Herbicide Spraying
Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance
The bridge in Reach 4 is owned and maintained by Skagit County. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal
Beaver dams are removed as required.

Current Reach Habitat Conditions
The channel in Reach 4 has been modified and simplified via historic maintenance dredging and diking activities. The right bank (west) of Reach 4 is an earthen dike dominated by reed canary grass. The left bank abuts hobby farms along a gradual hillside. The riparian vegetation along the left bank (east) of Reach 4 is primarily dominated by reed canary grass with the exception of a small area of mature deciduous trees in the middle of the reach and a KREP riparian enhancement project at the south end of Reach 4. Large woody debris is absent in Reach 4. Though silts and fines dominate the channel substrate in Reach 4, gravels from Bulson Creek may provide suitable spawning habitat in the immediate vicinity of the Bulson Creek confluence. There is a perennial source of water entering Reach 4 via Bulson Creek. However, despite this freshwater input, elevated water temperatures in Reach 4 would be expected due to the limited riparian cover. Elevated water temperatures and reduced dissolved oxygen levels, especially during the summer, would be expected to limit the suitability of the habitat for juvenile rearing.

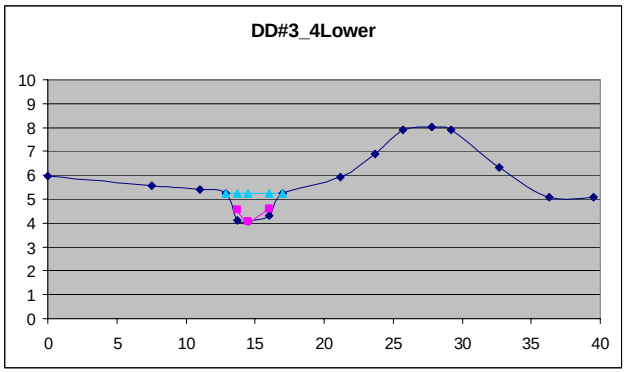
Riparian Characteristics
The right bank of Reach 4 is an earthen dike dominated by reed canary grass. The left bank abuts hobby farms along a gradual hillside. The riparian vegetation along the left bank (east) of Reach 4 is primarily dominated by reed canary grass with the exception of a small area of mature deciduous trees in the middle of the reach and a KREP riparian enhancement project at the south end of Reach 4.

Fish Passage Barriers & Obstacles – Figure 5
There are no known fish passage barriers in Reach 2. However, low flow conditions and/or elevated water temperatures could limit fish migration in the summer and early fall.

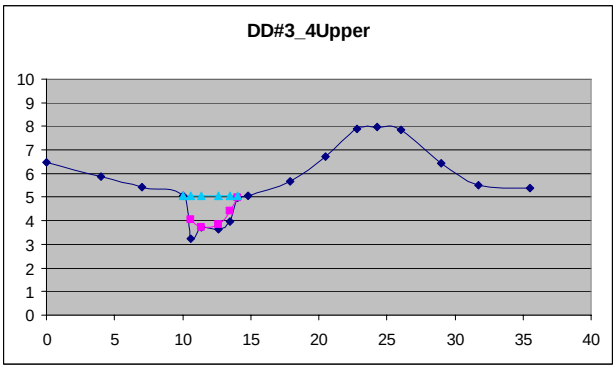
Spawning Habitat
Though silts and fines dominate the channel substrate in Reach 4, gravels from Bulson Creek may provide suitable spawning habitat in the immediate vicinity of the Bulson Creek confluence.

Channel Cross Sections

Lower Reach



Upper Reach



Reach Fish Utilization – Figure 5
Fish data has not been specifically collected for Reach 4 of Hill Ditch. However, fish observations in the tributary streams to Reach 1, Reach 2, Reach 3, and Reach 4 (Figure 4, Table 4, data points 1-25) indicate that coho salmon, Chinook salmon, cutthroat trout and steelhead (rainbow trout) may be present in Reach 4. It is reasonable to assume that where suitable spawning substrate is available in the vicinity of the Bulson Creek confluence, coho salmon, steelhead and cutthroat trout could spawn. It is also reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, and juvenile steelhead could potentially rear throughout this reach though their distribution depends on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality. Though there are no fish passage blockages in Reach 4, adult and juvenile fish migration may be periodically restricted by low flow conditions and poor water quality.

As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. Given that the spawning habitat in Reach 4 is not typical of the spawning habitats preferred by Chinook salmon or bull trout, it is reasonable to assume that successful Chinook salmon and bull trout spawning does not occur in Reach 4. However, given that the confluence of Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit

Bay, it is possible that juvenile Chinook salmon and bull trout from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Enhance the riparian habitat along the left bank (east) of Reach 4.

- Create side channel habitat along the east side of Hill Ditch immediately downstream of the confluence of Bulson Creek for the purpose of providing winter flood flow refuge habitat, winter rearing habitat and summer low flow rearing habitat.
- Establish riparian test plots along the lower half of the earthen containment dike along the right bank with willow and hardhack to control reed canary grass.

Reach Photographs – Figure 8

REACH 5

Reach Description - Figure 6

Reach 5 begins at State Route 534 bridge (326) and extends downstream to U.S. Interstate 5 (bridge 331).

Reach Length

Reach 5 is approximately 1.29 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 5 includes :

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
331	OTH	CPC	NON				Carpenter Cr
332	OTH	CPC	NON				Carpenter Cr

The OTH abbreviation in the Culvert Shape column of the table refers to bridge structures.

Bridges 331 and 332 are owned and maintained by the Washington State Department of Transportation.

Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in Reach 5 approximately every 10 years.

Channel Out of Water Mowing

DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing
DD #3 does not currently conduct channel in-water bucket mowing in Reach 5. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance
There are no culverts in Reach 5.

Herbicide Spraying
Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance
The bridges in Reach 5 are owned and maintained by the Washington State Department of Transportation. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal
Beaver dams are removed as required.

Current Reach Habitat Conditions
The channel in Reach 5 has been modified and simplified via historic maintenance dredging and diking activities. The right bank (west) of Reach 5 is an earthen dike dominated by reed canary grass. The left bank primarily abuts a forested hillside that supports mature deciduous and conifer trees. Where the channel migrates away from the forested hillside, the left bank between the channel and hillside is dominated by reed canary grass. There are also a couple hobby farms along the left bank (east) of Reach 5 where reed canary grass dominates the riparian vegetation. Large woody debris is absent in Reach 5. Silts and fines dominate the channel substrate. There is an intermittent source of freshwater entering the upper end of Reach 5 via an unnamed creek near State Highway 534. However, despite this freshwater input, elevated water temperatures in Reach 5 would be expected due to the limited riparian cover along the right bank (west). Elevated water temperatures and reduced dissolved oxygen levels, especially during the summer, would be expected to limit the suitability of the habitat for juvenile rearing. Adult and juvenile migration is possible through this reach though restricted at times by shallow water and poor water quality.

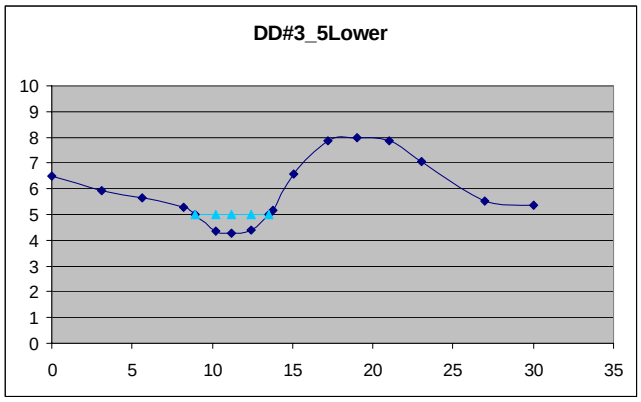
Riparian Characteristics
The right bank (west) of Reach 5 is an earthen dike dominated by reed canary grass. The left bank primarily abuts a forested hillside that supports mature deciduous and conifer trees. Where the channel migrates away from the forested hillside, the left bank between the channel and hillside is dominated by reed canary grass. There are also a couple hobby farms along the left bank of Reach 5 where reed canary grass dominates the riparian vegetation.

Fish Passage Barriers & Obstacles – Figure 5
There are no known fish passage barriers in Reach 5. However, low flow conditions and/or elevated water temperatures could limit fish migration in the summer and early fall.

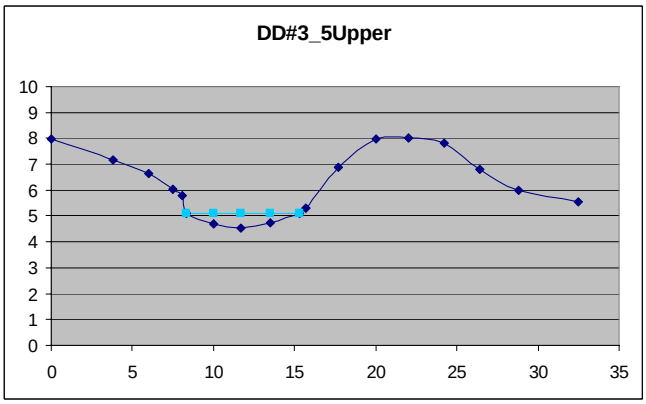
Spawning Habitat
Spawning habitat for salmonid species is not present in Reach 5.

Channel Cross Sections

Lower Reach



Upper Reach



Reach Fish Utilization – Figure 5
Fish observations from the FishDist Data are not available for Reach 5 of Hill Ditch. However, fish observations from the FishDist Data for the tributary streams to Reach 1, Reach 2, Reach 3, Reach 4, and Reach 5 (Figure 4, Table 4, data points 1-25) indicate that coho salmon, Chinook salmon, cutthroat trout, char and steelhead (rainbow trout) may be present in Reach 5. The SRSC trapped fish in Hill Ditch at the lower end of Reach 5 under the Interstate 5 bridge for several years in the early 1990s. The SCRS data base for Hill Ditch demonstrates that juvenile Chinook and coho are present in Reach 5. ELABORATE ON THIS

Given that the channel substrate in Reach 5 is dominated by silts and fines, it is assumed that spawning does not occur. It is also reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, and juvenile steelhead could potentially rear throughout this reach though their distribution depends on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality. Though fish passage blockages are not present in Reach 5, adult and juvenile fish migration may be periodically restricted by low flow conditions and poor water quality.

As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. Given the absence of suitable spawning habitat in Reach 5, it is assumed that successful Chinook salmon and bull trout spawning does not occur. However, given that the confluence of

Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit Bay, it is possible that juvenile Chinook salmon and bull trout from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Enhance the riparian habitat along left bank (east).
- Establish riparian test plots along the right bank of the earthen containment dike consistent with Corps dike maintenance standards to control reed canary grass.

Reach Photographs – Figure 8

REACH 6

Reach Description - Figure 6

Reach 6 begins at U.S. Interstate 5 (bridge 331) and extends downstream to the floodgate complex (91) at the confluence of Hill Ditch with Fisher Slough.

Reach Length

Reach 6 is approximately .78 miles in length.

Reach Drainage Infrastructure – Figure 2

The drainage infrastructure in Reach 6 includes :

Culvert Number	Culvert Shape	Culvert Material	Culvert Coating	Culvert Span/Dia (M)	Culvert Rise	Culvert Length (M)	Stream Name
333	OTH	CPC	NON	9.18	1.22		Carpenter Cr
334	OTH	CPC	NON				Carpenter Cr
335	OTH						Carpenter Cr
375	RND	PCC	NON	0.91	0.91	22	unnamed
00	RND						Carpenter Cr

With the exception of 333, the OTH abbreviation in the Culvert Shape column of the table refers to bridge structures. Number 333 is a siphon structure that carries Big Ditch under Hill Ditch and is maintained by DID #17.

Number	Type	Location	Description
26	Floodgates	Fisher Slough	3 10'X15' Floodgates
100	Flood Flow Return	Fisher Slough	6 5'X 6' Floodgates
01	Screw Gate Diversion	Hill Ditch	

Bridge 334 is owned and maintained by Burlington Northern Railroad. Bridge 335 is owned and maintained by the Washington State Department of Transportation. Culvert 375 is owned and maintained by a private landowner.

DD #3 is only responsible for maintaining the two floodgate structures (26, 100) and the screw gate diversion (01) in Reach 6. Floodgate complex 26 regulates the drainage between Hill Ditch and Fisher Slough. Floodgate complex 100 is used to return flood overflows from the adjacent farmland back into Hill Ditch. The screw gate diversion (01) is located immediately upstream of the Fisher Creek confluence with Hill Ditch is used to divert flood flows from Hill Ditch to the adjacent farmland to the west and north. Flood flows diverted from Hill Ditch via the screw gate diversion flow into Big Ditch or are returned to Hill Ditch via floodgate complex 100.

Drainage Maintenance Activities

Dredging

DD #3 dredges the channel in the immediate vicinity of the Fisher Creek confluence as needed when sufficient sediments are deposited in the channel from Fisher Creek as the result of a storm event or multiple storm events such that the conveyance capacity of the channel is significantly reduce. DD #3 dredges the channel in the remainder of Reach 6 approximately every 10 years.

Channel Out of Water Mowing

Along the upper 1/3 of Reach 6, DD #3 annually mows only the right bank of the channel in the spring and in the fall. The left bank is maintained by private landowners. Along the lower 2/3 of Reach 6, DD #3 annually mows both the right and left banks of the channel in the spring and in the fall.

Channel In-Water Bucket Mowing

DD #3 does not currently conduct channel in-water bucket mowing in Reach 6. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available

Culvert Maintenance

Culvert 375 is owned and maintained by a private landowner. DD #3 does not conduct culvert maintenance in this reach.

Herbicide Spraying

Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

The bridges in Reach 6 are owned and maintained by the Washington State Department of Transportation and Burlington Northern Railroad. DD #3 does not conduct bridge in this reach.

Beaver Dam Removal

Beaver dams are removed as required.

Floodgate
Maintenance of the floodgates (26) is conducted as needed. The maintenance typically includes removal of any lodged debris that may prevent the gates from closing properly and other normal maintenance necessary to insure the gates operate properly. Typically the district locks the floodgates (26) open between late May and late September to allow unimpeded freshwater exchange between Fisher Slough and Hill Ditch.

Flood Flow Return
Floodgate complex 100 is used to return flood overflows from the adjacent farmland back into Hill Ditch. Maintenance is conducted as needed. The maintenance typically includes removal of any lodged debris that may prevent the gates from closing properly and other normal maintenance necessary to insure the gates operate properly.

Screw Gate Diversion
The screw gate diversion (01) is located immediately upstream of the Fisher Creek confluence with Hill Ditch is used to divert flood flows from Hill Ditch to the adjacent farmland to the west and north. Flood flows diverted from Hill Ditch via the screw gate diversion flow into Big Ditch or are returned to Hill Ditch via floodgate complex 100. The maintenance typically includes removal of any lodged debris that may prevent the gate from closing and other normal maintenance necessary to insure the gates operate properly.

Current Reach Habitat Conditions
The channel in Reach 6 has been modified and simplified via historic maintenance dredging and diking activities. Between Interstate Highway 5 and the confluence of Fisher Creek, the right bank (north) is an earthen containment dike dominated by reed canary grass. The left bank along this section abuts a gently sloping hobby farm that is dominated by reed canary grass. Large woody debris is absent in this section. The channel substrate in this section of Reach 6 is dominated by silts and fines.

Between the Fisher Creek confluence and the Big Ditch Siphon (#333), the right bank (north) is an earthen containment dike dominated by reed canary grass. The left bank along this section is predominantly mature deciduous tress. Large woody debris is absent in this section. Though silts and fines dominate the channel substrate in this section of Reach 6, gravels from Fisher Creek may provide suitable spawning habitat in the immediate vicinity of the Fisher Creek confluence.

Between the Big Ditch Siphon (#333) and the districts floodgate structure at Fisher Slough (26), Big Ditch has a primary channel and a secondary channel confined between two earthen containment dikes (north and south) that are dominated by reed canary grass. Between the north and south earthen containment dikes, the primary and secondary channels are abutted by mature deciduous trees. Large woody debris is absent in this section and the channel substrate is dominated by silts and fines.

There is a perennial source of water entering Reach 6 via Fisher Creek. In addition, DD #3 typically locks the floodgates at complex #26 open between late May and late September to allow unimpeded freshwater input from Fisher Slough into Hill Ditch. Though elevated water temperature could limit fish rearing and migration in Reach 6, especially during the summer, elevated water temperatures in the lower section of Reach 6 would be expected to be somewhat mitigated by these fresh water inputs and by the mature riparian vegetation that is present along the primary and secondary channels between the north and south containment dikes.

Riparian Characteristics

Between Interstate Highway 5 and the confluence of Fisher Creek, the right bank (north) is an earthen containment dike dominated by reed canary grass. The left bank along this section abuts a gently sloping hobby farm that is dominated by reed canary grass.

Between the Fisher Creek confluence and the Big Ditch Siphon (#333), the right bank (north) is an earthen containment dike dominated by reed canary grass. The left bank along this section is predominantly mature deciduous tress.

Between the Big Ditch Siphon (#333) and the districts floodgate structure at Fisher Slough (26), Big Ditch has a primary channel and a secondary channel confined between two earthen containment dikes (north and south) that are dominated by reed canary grass. Between the north and south earthen containment dikes, the primary and secondary channels are abutted by mature deciduous trees.

Fish Passage Barriers & Obstacles – Figure 5

The primary point of access for fish to and from Hill Ditch is the district's floodgate complex #26 where the district's drainage is discharged into Fisher Slough. WDFW's Salmonscape database has identified the district's floodgate complex #26 as a fish passage barrier. However, the district's floodgate complex #26 is not a complete fish passage barrier. The barn door style side hinged flood gates do not completely block the upstream passage of adult and juvenile fish into Reach 6 though upstream passage is restricted to narrow windows of the tide cycles and river stages during which the floodgate is open and the discharge velocity does not exceed the upstream swimming capabilities of the individual fish. The window for upstream passage is greater for adult fish than for juvenile fish because of their stronger swimming capabilities. The floodgates do not completely block the downstream passage of adult and juvenile fish though downstream passage is restricted to the periods when the water surface elevation upstream of the floodgate is sufficiently greater than the water surface elevation downstream of the floodgate to create a head differential sufficient to open the tidegates. The district typically locks the floodgates open between late May and late September to enhance the freshwater exchange between Fisher Slough and Hill Ditch. During this time, upstream and downstream fish passage between Hill Ditch and Fisher Slough is greatly enhanced though the concrete sill of the floodgate complex can still impede upstream fish passage during low flow conditions.

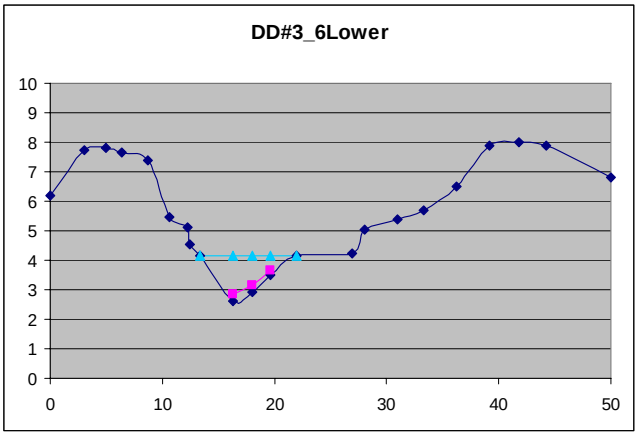
In addition to the district's floodgate complex #26, the concrete siphon structure #333 in Big Ditch (DID#17), which passes under Hill ditch, can limit fish passage during low flow

conditions. Low flow conditions and/or elevated water temperatures in Reach 6 can also limit fish passage in Hill Ditch in the summer and early fall.

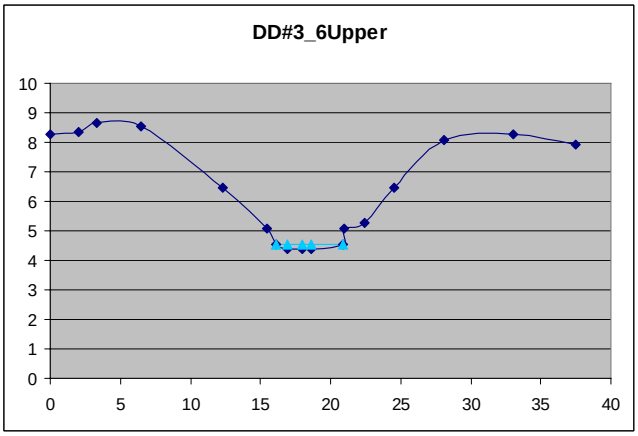
Spawning Habitat
Though silts and fines dominate the channel substrate in Reach 6, gravels from Fisher Creek may provide suitable spawning habitat in the immediate vicinity of the Fisher Creek confluence.

Channel Cross Sections

Lower Reach



Upper Reach



Reach Fish Utilization – Figure 5
It is generally assumed that fish from the South Fork Skagit River can immigrate into Hill Ditch via the floodgate complex #26 to forage on available prey. It is also generally assumed that the upstream distribution and duration of residence for these immigrating fish is limited by water quality and prey availability.

Fish observations from the FishDist Data are not available for Reach 6 of Hill Ditch. However, fish observations in the tributary streams to Reach 1, Reach 2, Reach 3, Reach 4, Reach 5, and Reach 6 (Figure 4, Table 4, data points 1-41) indicate that coho salmon, Chinook salmon, chum salmon, cutthroat trout, char and steelhead (rainbow trout) may be present in Reach 6. The SRSC trapped fish in Hill Ditch at the upper end of Reach 6 under the Interstate 5 bridge for several years in the early 1990s. The SCRS data base for Hill Ditch demonstrates that juvenile Chinook and coho are present in Reach 6. ELABORATE ON THIS

Given that the confluence of Fisher Slough with the South Fork Skagit River is upriver of the saltwater extent of Skagit Bay, in combination with the juvenile fish trapped by the SRSC under the Interstate 5 bridge, it is reasonable to assume that adult char, adult and juvenile cutthroat trout, juvenile coho salmon, juvenile Chinook salmon, juvenile chum salmon and juvenile steelhead from the South Fork Skagit River immigrate into Fisher Slough and Hill Ditch to rear prior to migrating to Skagit Bay. Their distribution, density and duration of residence will

depend on the quality and availability of suitable rearing habitat, i.e. channel complexity, riparian canopy, pool habitat and water quality.

It is reasonable to assume that where suitable spawning substrate is available in the vicinity of the Fisher Creek confluence, coho salmon, chum salmon, steelhead and cutthroat trout could spawn. As noted above in section A8-5, Chinook salmon and bull trout have been observed in Hill Ditch. Given that the spawning habitat in Reach 6 is not typical of the spawning habitats preferred by Chinook salmon or bull trout, it is also reasonable to assume that successful Chinook salmon and bull trout spawning does not occur in Reach 6.

Reach Fish Habitat Improvement Opportunities – Figure 7

- Restore flood plane marsh habitat and improve fish passage via a preferred alternative that results from the Nature Conservancy's Fisher Slough Restoration Plan.
- Flood dike set back along Tom Moore Slough downstream of Fisher Slough.

Reach Photographs – Figure 8

B2. WATERCOURSE REACH PRESCRIPTIONS

The parties to this Drainage Maintenance Agreement, in consultation with SRSC, have cooperatively integrated their respective needs regarding agriculture drainage and fish habitat improvement through the development of "Reach Prescriptions" for the each of the six reaches of Hill Ditch (Watercourse With Headwaters - green) that is within the boundaries of DD #3 and that is the responsibility of DD#3. The "Reach Prescriptions" are presented below.

Reach 1 Prescription
Drainage Maintenance:
Dredging
DD #3 dredges the channel in the immediate vicinity of the Carpenter Creek confluence as needed, after storm events deposit sufficient sediments from Carpenter Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 1 approximately every 10 years.

Channel Out of Water Mowing

- DD #3 does not mow the channel banks along this reach. Reach 1 parallels and abuts the east side of Stackpole Road, which is owned and maintained by Skagit County. Skagit County annually mows the right bank of the channel that abuts Stackpole Road. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 1. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- DD #3 does not conduct culvert maintenance. The culverts in this reach are owned and maintained by Skagit County.

Herbicide Spraying

- Historically, DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridges in Reach 1 are owned and maintained by private landowners. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Drainage and Habitat Improvement:

- Enhance the riparian vegetation along the left bank.
- Protect the mature riparian vegetation along the left bank.
- Establish riparian test plots along the lower half of the Stackpole Road embankment (right bank) where willow and hardhack could be planted to control reed canary grass.

Reach 2 Prescription
Drainage Maintenance:

Dredging

- DD #3 dredges the channel in the immediate vicinity of the Sandy Creek confluence, as needed, after storm events deposit sufficient sediments from Sandy Creek into Hill Ditch
- such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 2 approximately every 10 years.

Channel Out of Water Mowing

- DD #3 annually mows the right bank (earthen containment dike) of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 2. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- There are no culverts in Reach 2.

Herbicide Spraying

- Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridge in Reach 2 is owned and maintained by Skagit County. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Drainage and Habitat Improvement:

- Realign Hill Ditch to a more natural configuration between the confluence of Sandy Creek and wetland complex to the south.
- Realign Sandy Creek to a more natural configuration that restores the alluvial fan functions.
- Enhance the interconnections between Hill Ditch and the wetland complex between the alluvial fans of Sandy Creek and Johnson Creek.
- Realign Johnson Creek to a more natural configuration that restores the alluvial fan functions.

Reach 3 Prescription
Drainage Maintenance:

Dredging

- DD #3 dredges the channel in the immediate vicinity of the confluence of Johnson Creek, as needed, after storm events deposit sufficient sediments from Johnson Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 3 approximately every 10 years.

Channel Out of Water Mowing

- DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 3. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- There are no culverts in Reach 3.

Herbicide Spraying

- Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridges in Reach 3 are owned and maintained by Skagit County and private landowners. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Drainage and Habitat Improvement:

- Enhance the riparian habitat along the left bank (east) of Section 3.
- Establish riparian test plots along the lower half of the earthen containment dike along the right bank with willow and hardhack to control reed canary grass.

Reach 4 Prescription
Drainage Maintenance:

Dredging

- DD #3 dredges the channel in the immediate vicinity of the confluence of Bulson Creek, as needed, after storm events deposit sufficient sediments from Bulson Creek into Hill Ditch such that the conveyance capacity of Hill Ditch is significantly reduce. DD #3 dredges the channel in the remainder of Reach 4 approximately every 10 years.

Channel Out of Water Mowing

- DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 4. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- There are no culverts in Reach 4.

Herbicide Spraying

- Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridge in Reach 4 is owned and maintained by Skagit County. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Drainage and Habitat Improvement:

- Enhance the riparian habitat along the left bank (east) of Reach 4.
- Create side channel habitat along the east side of Hill Ditch immediately downstream of the confluence of Bulson Creek for the purpose of providing winter flood flow refuge habitat, winter rearing habitat and summer low flow rearing habitat.
- Establish riparian test plots along the right bank of the earthen containment dike consistent with Corps dike maintenance standards to control reed canary grass.

Reach 5 Prescription
Drainage Maintenance:
Dredging

- DD #3 dredges the channel in Reach 5 approximately every 10 years.

Channel Out of Water Mowing

- DD #3 annually mows the right bank of the channel in the spring and in the fall. The left bank of the channel is maintained by private landowners.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 5. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- There are no culverts in Reach 5.

Herbicide Spraying

- Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridges in Reach 5 are owned and maintained by the Washington State Department of Transportation. DD #3 does not conduct bridge maintenance in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Drainage and Habitat Improvement:

- Enhance the riparian habitat along left bank (east).
- Establish riparian test plots along the right bank of the earthen containment dike consistent with Corps dike maintenance standards to control reed canary grass.

Reach 6 Prescription
Drainage Maintenance:
Dredging

- DD #3 dredges the channel in the immediate vicinity of the confluence of Fisher Creek as needed when sufficient sediments are deposited in the channel from Fisher Creek as the result of a storm event or multiple storm events such that the conveyance capacity of the channel is significantly reduce. DD #3 dredges the channel in the remainder of Reach 6 approximately every 10 years.

Channel Out of Water Mowing

- Along the upper 1/3 of Reach 6, DD #3 annually mows only the right bank of the channel in the spring and in the fall. The left bank along this section is maintained by the

adjacent private landowner. Along the lower 2/3 of Reach 6, DD #3 annually mows the right and left banks of the channel in the spring and in the fall.

Channel In-Water Bucket Mowing

- DD #3 does not currently conduct channel in-water bucket mowing in Reach 6. However, channel in-water bucket mowing may be implemented in the future as appropriate mowing equipment becomes available.

Culvert Maintenance

- Culvert 375 is owned and maintained by a private landowner. DD #3 does not conduct culvert maintenance in this reach.

Herbicide Spraying

- Historically DD #3 has not used herbicides in this reach to control channel vegetation. However, in the future, DD #3 may begin using herbicides annually in this reach to control the channel vegetation and to prolong the time interval between maintenance dredging events.

Bridge Maintenance

- The bridges in Reach 6 are owned and maintained by the Washington State Department of Transportation and Burlington Northern Railroad. DD #3 does not conduct bridge in this reach.

Beaver Dam Removal

- Beaver dams are removed as required.

Floodgate

- Maintenance of the floodgates (26) is conducted as needed. The maintenance typically includes removal of any lodged debris that may prevent the gates from closing properly and other normal maintenance necessary to insure the gates operate properly. Typically the district locks the floodgates (26) open between late May and late September to allow unimpeded freshwater exchange between Fisher Slough and Hill Ditch.

Flood Flow Return

- Floodgate complex 100 is used to return flood overflows from the adjacent farmland back into Hill Ditch. Maintenance is conducted as needed. The maintenance typically includes removal of any lodged debris that may prevent the gates from closing properly and other normal maintenance necessary to insure the gates operate properly.

Screw Gate Diversion

- The screw gate diversion (01) is located immediately upstream of the Fisher Creek confluence with Hill Ditch is used to divert flood flows from Hill Ditch to the adjacent farmland to the west and north. Flood flows diverted from Hill Ditch via the screw gate diversion flow into Big Ditch or are returned to Hill Ditch via floodgate complex 100. The maintenance typically includes removal of any lodged debris that may prevent the gate from closing and other normal maintenance necessary to insure the gates operate properly.

Drainage and Habitat Improvement:

- Restore flood plane marsh habitat and improve fish passage via a preferred alternative that results from the Nature Conservancy's Fisher Slough Restoration Plan.
- Flood dike set back along Tom Moore Slough downstream of Fisher Slough.

B3. DRAINAGE AND HABITAT IMPROVEMENT IMPLEMENTATION MEASURES

Through mutual agreement between the parties to this Drainage Maintenance Agreement and in consultation with SRSC, DD #3 and WDFW commit to achieve the 5- year target goals as specified for each of the drainage and habitat improvement projects identified in the Watercourse Reach Prescriptions that are described below. Though it is the intent of the parties to work collaboratively for a period of 5 years to achieve the stated 5-year target goals, the parties acknowledge that in some circumstances the successful achievement of the identified target goals may depend of factors outside of the control of the parties. At the end of year 5, it is the intent of the parties to review the progress that has been made towards achieving the identified 5-year target goals and to determine whether sufficient commitment has been made by the parties to justify renewal of the Drainage Maintenance Agreement and General 5-year HPA.

1. Work with the Nature Conservancy to develop a preferred Fisher Slough Restoration Plan that restores flood plane marsh habitat in the vicinity of the Fisher Slough confluence and that improves fish passage at floodgate complex #26. Support the preferred Fisher Slough Restoration Plan. Reach 6

2. Enhance the channel interconnections between Hill Ditch and the existing wetland complex between the historic alluvial fans of Sandy Creek and Johnson Creek. Reach 2

3. Realign Hill Ditch and Sandy Creek to more natural configurations between the confluence of Sandy Creek with Hill Ditch and wetland complex to the south. Realign Sandy Creek to restore its alluvial fan functions. Reach 2

4. Realign Johnson Creek to a more natural configuration that restores the alluvial fan functions. Reach 2

5. Create side channel rearing habitat along the east side of Hill Ditch immediately downstream of the confluence of Bulson Creek for the purpose of providing winter flood flow refuge habitat, winter rearing habitat and summer low flow rearing habitat. Reach 4

6. Establish riparian test plots along the right bank of the earthen containment dike consistent with Corps dike maintenance standards to control reed canary grass. Reach 5

7. Possible land acquisition for dike set back, channel re-alignment and/or riparian enhancement.

1. Project Description:

Work with the Nature Conservancy to develop a preferred Fisher Slough Restoration Plan that restores flood plane marsh habitat in the vicinity of the Fisher Slough confluence and that improves fish passage at floodgate complex #26. Support the preferred Fisher Slough Restoration Plan. Reach 6

5-Year Target Goals:

- Assist TNC with the feasibility assessment.
- Assist TNC with developing a project design.
- Assist TNC with acquiring all or part of the ownership of or easements to the land base necessary for project implementation.
- Assist TNC with implementing the designed project.

Timeline: 2007 to 2011

DD#3 Commitments

- Commits to assist TNC with the feasibility assessment and with the development of a preferred project design.
- Commits to assist TNC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to assist TNC with securing the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to support TNC's efforts to secure the funding to implement the project.
- Commits to assist TNC with implementing the project.

WDFW Commitments:

- Commits to assist TNC with the feasibility assessment and with the development of a preferred project design.
- Commits to assist TNC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to assist TNC with securing the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to support TNC's efforts to secure the funding to implement the project.
- Commits to assist TNC with implementing the project.

SRSC Commitments:

- Commits to assist TNC with the feasibility assessment and with the development of a preferred project design.
- Commits to assist TNC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to assist TNC with securing the ownership of or easement to all or part of the easements to the land base necessary to implement the project.

- Commits to support TNC's efforts to secure the funding to implement the project.
- Commits to assist TNC with implementing the project.

2. Project Description:

Enhance the channel interconnections between Hill Ditch and the existing wetland complex between the alluvial fans of Sandy Creek and Johnson Creek. Reach 2

5-Year Target Goals:

- Conduct a feasibility assessment.
- Develop a project design.
- Acquire all or part of the ownership of or easements to the land base necessary for project implementation.
- Implement the designed project.

Timeline: 2007 to 2011

DD#3 Commitments

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the funding necessary to implement the project.
- Commits to work with WDFW and SRSC to implement the project.

WDFW Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with DD #3 and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with DD #3 and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.

- Commits to work with DD #3 and SRSC to secure the funding necessary to implement the project.
- Commits to work with DD #3 and SRSC to implement the project.

SRSC Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and DD #3 to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and DD #3 to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the funding necessary to implement the project.
- Commits to work with WDFW and DD #3 to implement the project.

3. Project Description:

Realign Hill Ditch and Sandy Creek to more natural configurations between the confluence of Sandy Creek with Hill Ditch and wetland complex to the south. Realign Sandy Creek to restore its alluvial fan functions. Reach 2

5-Year Target Goals:

- Conduct a feasibility assessment.
- Develop a project design.
- Acquiring all or part of the ownership of or easements to the land base necessary for project implementation.
- Implementing the designed project.

Timeline: 2007 to 2011

DD#3 Commitments

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.

- Commits to work with WDFW and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the funding necessary to implement the project.
- Commits to work with WDFW and SRSC to implement the project.

WDFW Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with DD #3 and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with DD #3 and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the funding necessary to implement the project.
- Commits to work with DD #3 and SRSC to implement the project.

SRSC Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and DD #3 to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and DD #3 to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the funding necessary to implement the project.
- Commits to work with WDFW and DD #3 to implement the project.

4. Project Description:

Realign Johnson Creek to a more natural configuration that restores the alluvial fan functions. Reach 2

5-Year Target Goals:

- Conduct a feasibility assessment.
- Develop a project design.

- Acquiring all or part of the ownership of or easements to the land base necessary for project implementation.
- Implementing the designed project.

Timeline: 2007 to 2011
1012 to 2016

DD#3 Commitments

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the funding necessary to implement the project.
- Commits to work with WDFW and SRSC to implement the project.

WDFW Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with DD #3 and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with DD #3 and SRSC to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the funding necessary to implement the project.
- Commits to work with DD #3 and SRSC to implement the project.

SRSC Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and DD #3 to seek the funding necessary to conduct a feasibility assessment and to develop a project design.

- Commits to work with WDFW and DD #3 to make the landowner contacts needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the funding necessary to implement the project.
- Commits to work with WDFW and DD #3 to implement the project.

5. Project Description:

Create side channel habitat along the east side of Hill Ditch immediately downstream of the confluence of Bulson Creek for the purpose of providing winter flood flow refuge habitat, winter rearing habitat and summer low flow rearing habitat. Reach 4

5-Year Target Goals:

- Conduct a feasibility assessment.
- Develop a project design.
- Acquire all or part of the ownership of or easements to the land base necessary for project implementation.
- Implement the designed project.

Timeline: 2012 to 2016

DD#3 Commitments

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and SRSC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the funding necessary to implement the project.
- Commits to work with WDFW and SRSC to implement the project.

WDFW Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.

- Commits the time to work with DD #3 and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with DD #3 and SRSC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the funding necessary to implement the project.
- Commits to work with DD #3 and SRSC to implement the project.

SRSC Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and DD #3 to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and DD #3 with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the funding necessary to implement the project.
- Commits to work with WDFW and DD #3 to implement the project.

6. Project Description:
Establish riparian test plots along the right bank of the earthen containment dike consistent with Corps dike maintenance standards to control reed canary grass. Reach 5

5-Year Target Goals:

- Conduct a feasibility assessment.
- Develop a project design.
- Acquire all or part of the ownership of or easements to the land base necessary for project implementation.
- Implement the designed project.

Timeline: 2012 to 2016

DD#3 Commitments

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.

- Commits the time to work with WDFW and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and SRSC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and SRSC to secure the funding necessary to implement the project.
- Commits to work with WDFW and SRSC to implement the project.

WDFW Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with DD #3 and SRSC to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with DD #3 and SRSC with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with DD #3 and SRSC to secure the funding necessary to implement the project.
- Commits to work with DD #3 and SRSC to implement the project.

SRSC Commitments:

- Commits the time necessary to participate in the project feasibility assessment and help develop a preferred project design.
- Commits the time to work with WDFW and DD #3 to seek the funding necessary to conduct a feasibility assessment and to develop a project design.
- Commits to work with WDFW and DD #3 with landowner contacts as needed for the purpose of securing the ownership of or easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the ownership of or easement to all or part of the easements to the land base necessary to implement the project.
- Commits to work with WDFW and DD #3 to secure the funding necessary to implement the project.
- Commits to work with WDFW and DD #3 to implement the project.

B4. 5-YEAR INCREMENTAL MAINTENANCE DREDGING STRATEGY

Rough Reach Length Estimates
Reach 1 = .76 miles
Reach 2 = 1.2 miles
Reach 3 = .71 miles
Reach 4 = .58 miles
Reach 5 = 1.2 miles
Reach 6 = .8 miles

Hill Ditch Total= 5.2 miles

The parties to the district's Drainage Maintenance Agreement, in consultation with the SRSC, agree that it is necessary to limit the district's maintenance dredging in Hill Ditch in any give year in order to ensure that sufficient undisturbed habitat is maintained to support the needs of the fish that may be present.

The parties to this Drainage Maintenance Agreement, in consultation with the SRSC, agree to the following ***5-Year Incremental Maintenance Dredging Strategy*** for Hill Ditch which:

1. Prioritizes the district's maintenance dredging activities.

2. Limits the district's maintenance dredging in any given year to approximately 20% of the total length of Hill Ditch or 1.04 miles.

3. Limits the district's maintenance dredging in any given year to a total of 3 different sites.

4. Couples the district's authorization to conduct maintenance dredging in any given year to the successful completion of the annual drainage/habitat improvement project benchmarks listed below which are based on the drainage/habitat improvement project priorities established in Section B3 of the district's Drainage Maintenance Plan.

5. Acknowledges that in some circumstances, the successful completion of the annual drainage/habitat improvement project benchmarks listed below are subject to landowner cooperation. For those projects where a landowner critical to a specific drainage/habitat improvement project is unwilling to participate, the annual bench marks listed below will be modified to include the next priority drainage/habitat improvement project established in Section B3 of the district's Drainage Maintenance Plan.

6. Allows 1.04 miles of maintenance dredging credit for each year that the annual drainage/habitat improvement benchmarks are successfully completed.

7. Allows the district to bank maintenance dredging credits for the successful completion of the annual drainage/habitat improvement benchmarks for a given year in advance of

implementing maintenance dredging and allows the banked maintenance dredging credits to be used in future years.

8. Allows the district to extend the total channel length of 1.04 miles noted above in item 2 that can be dredged in any given year by a maximum distance of 10% or 549 feet contingent upon the district having sufficient maintenance dredging credits in the bank.

9. Provides that the district will fund the implementation of the salmon removal BMPS required of the district in Addendum A3 of the district's Drainage Maintenance Agreement for all maintenance dredging in excess of ½ mile.

10. Provides that the district's successful completion of the annual drainage/habitat improvement benchmarks will be agreed to by the parties to the district's Drainage Maintenance Agreement, in consultation with SRSC, will be recorded in writing by WDFW and will be included in the *Supplements To The Plan* section of the district's Drainage Maintenance Plan.

11. Provides that the district's maintenance dredging credits will be accounted for in the *Supplements To The Plan* section of the district's Drainage Maintenance Plan and will be reviewed by the parties to the district's Drainage Maintenance Agreement, in consultation with SRSC, during the annual meetings required by Part III (H) of the district's Drainage Maintenance Agreement.

12. Drainage/habitat improvement projects generally occur through the following sequence:
    1. Secure landowner permission, landowner easement or ownership of the land.
    2. Secure funding for feasibility assessment and to develop the project design.
    3. Conduct feasibility assessment and complete the project design.
    4. Secure the funding to implement the project design.
    5. Secure the local, state and federal permits to implement the project.
    6. Implement the habitat improvement project.

    The maintenance dredging credit will be made available to the district after step 3 of the above drainage/habitat improvement project sequence contingent upon the district providing WDFW a letter that supports the drainage/habitat improvement project through the construction phase.

B5. Annual Drainage/Habitat Improvement Project Benchmarks

Year 1

- DD#3 shall complete a longitudinal bed elevation survey of Hill Ditch.
- DD#3 shall use the longitudinal bed elevation survey of Hill Ditch to identify the district's annual dredging priorities.

Project #1

- DD#3 will work with The Nature Conservancy to develop a preferred Fisher Slough Restoration Plan that restores flood plane marsh habitat in the vicinity of the Fisher Slough confluence and that improves fish passage at floodgate complex #26.
- DD#3 will support The Nature Conservancy's preferred Fisher Slough Restoration Plan.
- DD#3 will support The Nature Conservancy's efforts to secure the funding necessary to implement The Nature Conservancy's preferred Fisher Slough Restoration Plan.

Project #3

- DD#3 will work with WDFW and SRSC to jointly contact the landowners pertinent to implementing Drainage and Habitat Improvement Project #3.
- DD#3 will work with WDFW and SRSC to jointly secure the landowner agreements and easements pertinent to implementing Drainage and Habitat Project #3.
- DD#3 will work with WDFW and SRSC to jointly submit a funding proposal for the design and construction of Drainage and Habitat Improvement Project #3.

Year 2

Project #1

- DD#3 will continue to support The Nature Conservancy's efforts to secure the funding necessary to implement The Nature Conservancy's preferred Fisher Slough Restoration Plan.

Project #3

- DD#3 will work with WDFW and SRSC to jointly secure the funding to implement the construction of Drainage and Habitat Improvement Project #3.
- DD#3 will work with WDFW and SRSC to jointly complete the construction design for Drainage and Habitat Improvement Project #3.
- DD#3 will work with WDFW and SRSC to jointly submit the local, state and federal permits applications required for the construction of Drainage and Habitat Improvement Project #3.
- DD#3 will work with WDFW and SRSC to jointly secure the local, state and federal permits required for the construction of Drainage and Habitat Improvement Project #3.

Project #2

- DD#3 will work with WDFW and SRSC to jointly contact the landowners pertinent to implementing Drainage and Habitat Improvement Project #2.
- DD#3 will work with WDFW and SRSC to jointly secure the landowner agreements and easements pertinent to implementing Drainage and Habitat Project #2.
- DD#3 will work with WDFW and SRSC to jointly submit a funding proposal for the design and construction of Drainage and Habitat Improvement Project #2.

Year 3

Project #3 - Implementation

- DD#3 will work with WDFW and SRSC to jointly notify pertinent landowners of the project construction timeline.
- DD#3 will work with WDFW and SRSC to jointly initiate project construction and oversight.

Project #2

- DD#3 will work with WDFW and SRSC to jointly secure the funding to implement the construction of Drainage and Habitat Improvement Project #2.
- DD#3 will work with WDFW and SRSC to jointly complete the construction design for Drainage and Habitat Improvement Project #2.
- DD#3 will work with WDFW and SRSC to jointly submit the local, state and federal permits applications required for the construction of Drainage and Habitat Improvement Project #2.
- DD#3 will work with WDFW and SRSC to jointly secure the local, state and federal permits required for the construction of Drainage and Habitat Improvement Project #2.

YEAR 4

Project #2 - Implementation

- DD#3 will work with WDFW and SRSC to jointly notify pertinent landowners of the project construction timeline.
- DD#3 will work with WDFW and SRSC to jointly initiate project construction and oversight.

Project #4

- DD#3 will work with WDFW and SRSC to jointly contact the landowners pertinent to implementing Drainage and Habitat Improvement Project #4.
- DD#3 will work with WDFW and SRSC to jointly secure the landowner agreements and easements pertinent to implementing Drainage and Habitat Project #4.

- DD#3 will work with WDFW and SRSC to jointly submit a funding proposal for the design and construction of Drainage and Habitat Improvement Project #4.

YEAR 5

Project #4

- DD#3 will work with WDFW and SRSC to jointly secure the funding to implement the construction of Drainage and Habitat Improvement Project #4.
- DD#3 will work with WDFW and SRSC to jointly complete the construction design for Drainage and Habitat Improvement Project #4.
- DD#3 will work with WDFW and SRSC to jointly submit the local, state and federal permits applications required for the construction of Drainage and Habitat Improvement Project #4.
- DD#3 will work with WDFW and SRSC to jointly secure the local, state and federal permits required for the construction of Drainage and Habitat Improvement Project #4.

YEAR 6

Project #4 - Implementation

- DD#3 will work with WDFW and SRSC to jointly notify pertinent landowners of the project construction timeline.
- DD#3 will work with WDFW and SRSC to jointly initiate project construction and oversight.

C. OTHER ASSESSMENTS WITHIN DD #3

1. House Bill 1418 Report: Tidegates and Intertidal Salmon Habitat in the Skagit Basin, Carol Smith and Ed Manary, 2004.
2. Skagit Chinook Recovery Plan, Skagit River System Cooperative and Washington Department of Fish and Wildlife, 2005.
3. Preliminary Assessment Of Historic Conditions Of The Skagit River In The Fir Island Area: Implications For Salmonid Habitat Restoration, Brian Collins, 1998.
4. Priority Fish and Wildlife Projects Identified by Washington Department of Fish and Wildlife within the Greater Skagit River Ecosystem Planning Area, WDFW, 2002.
5. Application Of The Skagit Watershed Council's Strategy: River Basin Analysis of the Skagit and Samish Basins, Skagit Watershed Council, 1999.
6. Skagit County Baseline Monitoring Project, 2001-2003.
7. Fisher Slough – Preferred Restoration Plan – Draft Report, Tetra Tech, Inc., 2006.
8. Carpenter Creek, Hill Ditch and Fisher Slough Watersheds Initial Flood and Sediment Study - Draft Report, Tetra Tech, Inc., 2006.
9. FY1995 Skagit River Chinook Restoration Research. Hayman et al. August 1996.
10. Fisher Slough Preferred Restoration Plan. Tetra Tech. October 2006.

11. Carpenter Creek, Hill Ditch, and Fisher Slough Watersheds Initial Flood and Sediment Study. Tetra Tech. October 2006.

D. BEST MANAGEMENT PRACTICES – DISTRICT UNIQUE CIRCUMSTANCES

D1. General

Artificial Watercourses

The drainage infrastructure and maintenance activities in the district's artificial watercourses are not unique or significantly different from the infrastructure and maintenance activities contemplated in the development of the Drainage Maintenance Agreement and the Best Management Practices (Addendum A). Therefore, for the above reasons and consistent with Part III (C) of the Drainage Maintenance Agreement for DD #3, the Best Management Practices identified in Addendum A of the Drainage Maintenance Agreement for *Artificial Watercourses* (yellow) will apply as written.

D2. Beaver Dams

Best Management Practices (BMPs) for beaver dam management were not included with the BMPs in Addendum A of the Drainage Maintenance Agreement and are therefore included here as part of the Drainage Maintenance Plan. Consistent with Part III (D) of the Drainage Maintenance Agreement, the following beaver dam management BMPs will apply. The beaver dam management BMPs for the district's *Artificial Watercourses* (yellow) will be voluntarily applied by the district. The following beaver dam management BMPs for the district's *Managed Watercourses With Headwaters* (green) will be included in the district's 5-Year General Hydraulic Project Approval. Also, consistent with the intent of PART III (D) of the Drainage Maintenance Agreement, beaver dam management in the district's *Natural Watercourse* (Fisher Slough, Skagit River) will require Individual Hydraulic Project Approvals as provided for in RCW 77.55.

Artificial Watercourses (yellow)

1. TIMING LIMITATIONS: When water is present in the channel, beaver dam removal/modifications below the waterline and within 300 feet of a confluence with a marine water body, natural watercourse or an managed watercourse with headwaters, the removal/modification of beaver a dam will only occur from August 1 through October 15 of any year for the protection of migrating juvenile and adult salmon.

2. The general HPA provisions for Artificial Watercourses (Addendum A) will apply.

3. Work will only be conducted during low flow conditions.

4. Under no circumstances will explosives be used to remove the beaver dam.

5. The beaver dam will be removed or modified gradually to provide for a controlled, slow release of the impounded water.

6. Removal or modification of the beaver dam will be accomplished by hand, with hand tools, winches and/or motorized equipment.

7. The woody materials removed from the beaver dam will be deposited landward of the top of the channel bank.

8. A list of beaver dam removal/modification activities will be included in the district's annual Drainage Maintenance Activity Report as specified in Part III- (H) of the districts Drainage Maintenance Agreement.

Managed Watercourses With Headwaters (green)

Consistent with Section III – (F) of the district's Drainage Maintenance Agreement, for purposes of implementing the Drainage Maintenance Agreement entered into between WDFW and a District, the goal and intent will be to offset direct and/or indirect impacts to fish and fish habitat by incorporating the following BMPs as conditions associated with a General HPA issued for beaver dam removal.

In those instances where, during the development of the district's Drainage Maintenance Plan, beaver dam removal activities are determined by the Parties, in consultation with SRSC, to warrant the need for additional measures to offset otherwise unavoidable impacts to fish and/or fish habitat, WDFW and the appropriate District's Commissioners will work collaboratively and cooperatively to identify and implement appropriate and acceptable Habitat Improvement Projects. The goals, objectives and obligations necessary to implement the mutually agreed upon habitat improvement projects will be clearly identified in each district's Drainage Maintenance Plan.

1. TIMING LIMITATIONS: When water is present in the channel, the removal or modification of a beaver dam shall only occur from August 1 through October 15 of any year for the protection of migrating juvenile and adult salmon.

2. When water is present in the channel and the removal or modification of a beaver dam out side of the above referenced August 1 through October 15 window is necessary, modifications to the provisions below may be required to adequately protect fish. Additional mitigation, beyond what is specified in the districts Drainage Maintenance Plan, may also be required.

3. A WDFW Area Habitat Biologist shall survey each beaver dam removal or modification site prior to the start of removal or modification activities. A district commissioner shall contact the Skagit County WDFW Area Habitat Biologist (AHB) prior to the start of removal or modification activities to arrange for a WDFW survey of the beaver dam site.

4. The general HPA Provisions for a Managed Watercourse With Headwaters (Addendum A) shall apply.

5. Work shall only be conducted during low stream flow conditions.

6. Under no circumstances shall explosives be used to remove the beaver dam.

7. The beaver dam shall be removed or modified gradually to provide for a controlled, slow release of the impounded water. Removal of the beaver dam shall not exceed 1-foot vertical elevation of the dam during a 24-hour period.

8. Removal or modification of the beaver dam shall primarily be accomplished by hand or with hand tools, such as shovels, rakes, pitchforks, chain saws, and pevees. Winches may be used to dislodge some of the beaver dam material, provided that the not more than 1 vertical foot of the dam is removed in a 24-hour period as specified above in provision 4.

9. Equipment may be used to remove the beaver dam provided that the not more than 1 vertical foot of the dam is removed in a 24-hour period as specified above in provision 4. Equipment shall only be operated from the top of the channel bank. Equipment shall not cross the channel.

10. Large wordy material 6 feet or longer and 4 inches or greater in diameter embedded in the channel bank or streambed shall be left undisturbed and intact.

11. As determined during the WDFW site survey specified in provision 3, large woody material 6 feet or longer and 4 inches or greater in diameter shall either be placed or anchored in the channel to provide stable, functional fish habitat or shall be set aside in a secure location for use in future habitat improvement projects.

12. The smaller limbs and woody materials removed from the beaver dam shall be deposited landward of the top of the channel bank.

13. The removal of and damage to existing woody stem riparian vegetation within 200 feet of the channel shall be held to the absolute minimum necessary to remove the beaver dam.

14. Existing woody stem riparian vegetation within 200 feet of the channel that is removed or damaged during removal of the beaver dam shall be replaced with native species during the spring or fall immediately following beaver dam removal.

15. For reoccurring or persistent beaver dams, the district shall work with WDFW to investigate the merits of installing a flexible leveler or beaver deceiver.

16. All beaver dam removal or modification activities shall be included in the district' annual Drainage Maintenance Activity Report as specified in Part III- (H) of the district's Drainage Maintenance Agreement. The district's annual record of beaver dam removal or modification activities shall include the following information for each beaver dam site: location, reason for removal/modification, date of site survey with WDFW, removal/modification start date, removal/modification end date, method of removal/modification, removal/modification problems, future removal/modification recommendations, are beaver dams at the site a reoccurring problem, before and after photographs.

17. An individual Hydraulic Project Approval shall be required for beaver dam removal or modification activities within the boundaries of the wetland creation/enhancement, estuary creation/enhancement, alluvial fan creation/enhancement and side channel creation/enhancement projects identified in the Drainage and Habitat Improvement Implementation Measures section (B3) of the district's Drainage Maintenance Plan.

D3. PUMPS

The drainage infrastructure for DD #3 does not include a pump site.

E. HYDRAULIC PROJECT APPROVAL COMPLIANCE

DD #3 is bound to comply with the provisions and conditions of any and all Hydraulic Project Approvals (HPA's) issued pursuant to this Agreement. Failure to do so can result in revocation of the General Hydraulic Project Approval (GHPA) and may result in other penalties as provided by law. In the event a General Five-Year HPA issued pursuant to this Agreement is revoked or rescinded, DD #3 will henceforth be required to secure a individual site and/or project specific HPA for each drainage maintenance activity that will occur below the ordinary high water line in watercourses (other than those that are wholly artificial) within the legally established boundaries of the District. Unavoidable impacts to fish and fish habitat occurring as a result of these individually permitted activities will be mitigated on a case-by-case basis.