DRAFT

LOWER SOUTH FORK AND UPPER SKOKOMISH RIVER

Hydraulic and Geomorphic Analysis and Recommendations for Action

August I997

Project # SC-97014-1

Prepared for:

Mason County Department of Public Works
Courthouse Building #1
411 North Fifth Street
Shelton, WA 98584

PREPARED BY:

Skillings~Connolly, Inc.
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and

Simons and Associates
3528 JFK Parkway, Suite 1
Fort Collins, CO 80525

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HYDRAULIC AND GEOMORPHIC ANALYSIS OF THE LOWER SOUTH FORK AND UPPER SKOKOMISH RIVER AND RECOMMENDATIONS FOR ACTION

Skillings-Connolly, Inc.
Simons & Associates
August 14, 1997

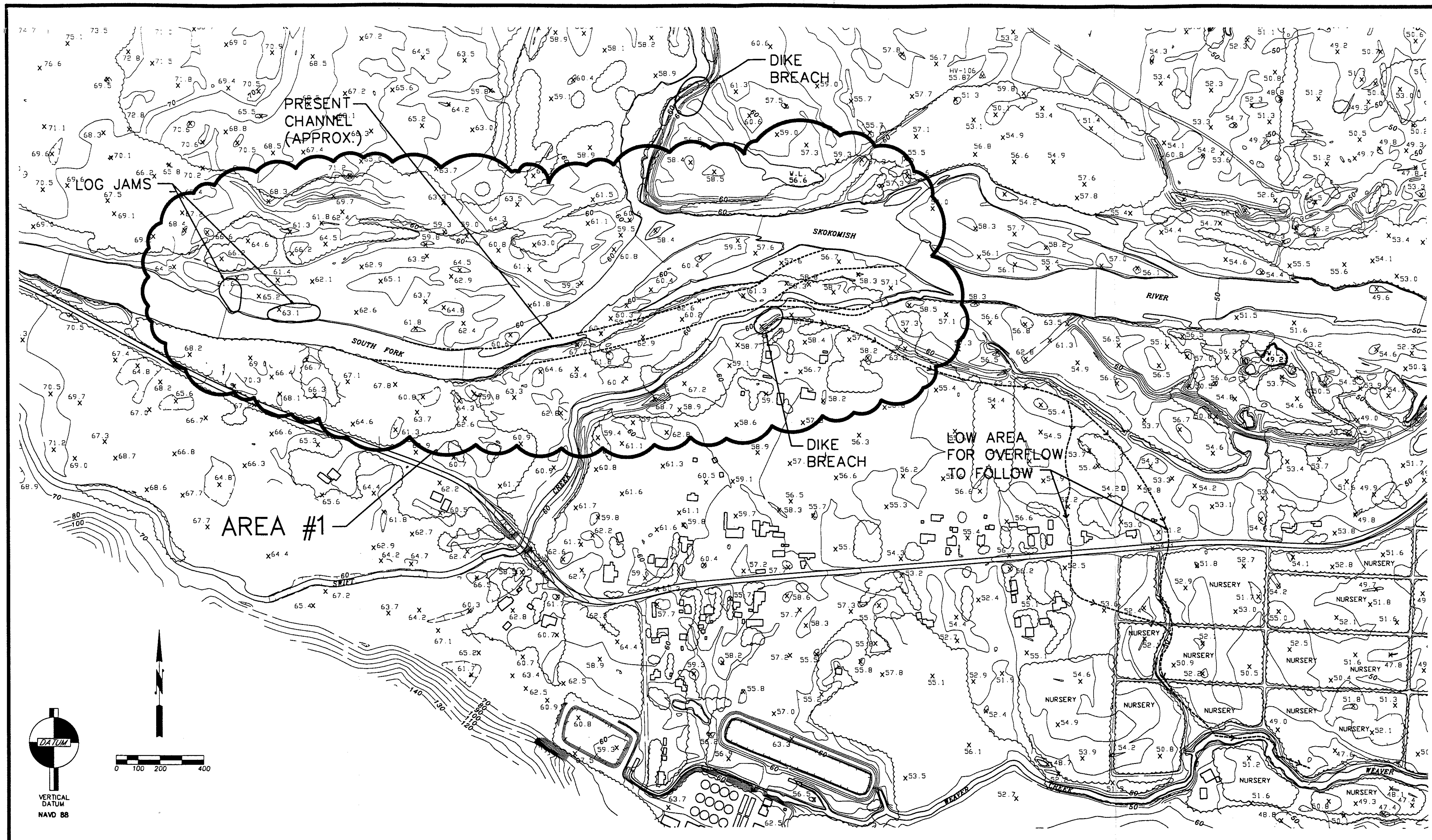
1.0 Introduction

The Skokomish River system is a dynamic alluvial river system. Alluvial rivers are those which are formed by the sediment which the rivers themselves transport and deposit. The Skokomish River has been experiencing aggradation in recent decades. During the 1996/1997 high flow season, the Skokomish River experienced several significant flood events which seem to have exacerbated its dynamic nature. Mason County is concerned over flooding and channel dynamics trends, and has declared a state of emergency. A site visit focusing on the upper Skokomish River and the lower South Fork was made on July 18, 1997 to observe current conditions. This report documents observations made on the site visit, presents analysis of the current situation, and provides recommendations for consideration in dealing with flooding and channel dynamics issues for these reaches of the river system.

2.0 Summary of Site Visit

A site visit of the upper Skokomish River, and lower South Fork was made on July 18, 1997 to observe channel conditions in this portion of the river system. The following material briefly documents the areas of concern which were observed on this visit (see Figure 2.1 for these locations).

- **Area 1,** near the confluence of the North Fork and South Fork of the Skokomish River, from approximately 1/2 mile downstream to approximately 1/2 mile upstream from the confluence.
- **Area 2** is upstream on the South Fork above the first sharp bend in the vicinity of Five Mile Creek.
- **Area 3** is upstream a little farther on the South Fork at a location downstream from the high cliff near the sharp turn in the River The location is about opposite of where the continuation of the Sunnyside Road is located as it crosses the North Fork and continues on to the South Fork.
- **Area 4** is further upstream where the river comes down from the canyon and makes a sharp bend at the upper end of the Guy Parsons' property.



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DESIGNED BY: L. RENZ	8/97	NO.	DATE	97014-1
ENTERED BY: K. KIMMEL	8/97			
CHECKED BY:				
PROJ. ENGR.:				

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SKOKOMISH RIVER

SKOKOMISH WA

BANK EROSION
FIGURE 2.1(A)

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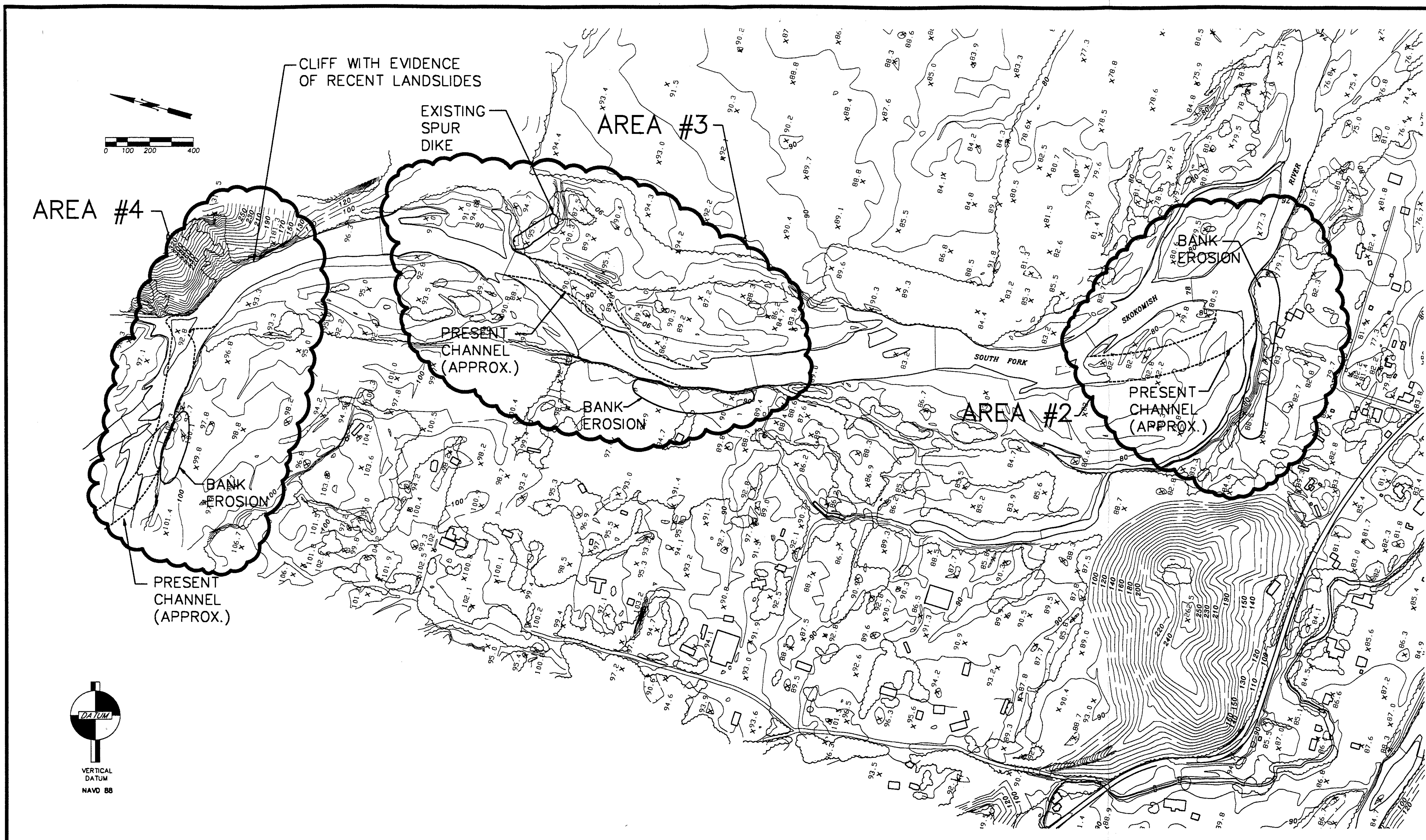
BY: DIRECTOR OF PUBLIC WORKS DATE: APPROVAL EXPIRES:

JOB NUMBER 97014-1

SHEET 1 OF 2 SHEETS



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SKOKOMISH RIVER

SKOKOMISH WA

BANK EROSION FIGURE 2.1(B)

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JOB NUMBER 97014-1
SHEET 2 of 2 SHEETS

The bank erosion is further described below and in the accompanying photos:

Area 1

At Area 1, the South Fork of the Skokomish River has shifted southward near the confluence of the North Fork and the South Fork and has removed as much as 200 feet of riparian area just at the location where the South Fork and North Fork previously came together. The South Fork now has moved south 200 feet and the confluence point of the rivers during low flow has changed to a point approximately 1,000 feet downstream. The river has moved south assuming a portion of the Swift Creek location and has split so a portion is flowing down into the bed of Swift Creek. Both flows continue separately another 700 feet downstream to where they finally join together. In the location where the South Fork has shifted the farthest south it is flowing right near the toe of the existing dike. During the March 1997 flood event the dike was overtopped which caused a breach that washed out a portion of this dike. The water flowing through the breach continued down through the Fultz property, down across the Skokomish Valley Road, and into Weaver Creek. There is significant concern that high water this coming year could result in a major avulsion at this location. If such an avulsion were to occur, which changed the main Skokomish River channel to the Weaver Creek corridor, significant private property and public infrastructure would be damaged or destroyed and potentially life-threatening conditions could result.

We also investigated a report that perhaps some spur dikes had been constructed on the north shore of the River that were causing the South Fork to shift to the south, damage the dike, and remove the riparian area in front of the dike in this area. Our review on July 18 disclosed no spur dike construction of any sort on the north bank. Subsequent reports that there was a spur dike further upstream on the large gravel bar to the west, just above the confluence, gave cause for a subsequent July 31 field review. On July 31 no dike construction was found; however, two previously observed log jams at the upper end of this gravel bar were examined closer by wading the river to get access to them. It was discovered that one of those log jams contains several large earthmover-type rubber tires, an old car body, and several stumps and logs. All of these are tied together with a steel cable. It does not appear, however, that this material was constructed at this location. It appears that the material was dislodged at a location somewhere upstream and ended up on the gravel bar in the form of a log jam. It is possible, based on the location of these log jams, that they have influenced the river to redirect it's energy to the south. This action perhaps is responsible for shifting the South Fork to a more southerly location causing the erosion in front of the dike. It is noted that this point is the narrowest point between the existing dikes on the north and south banks, therefore, one could expect that this area would be subject to erosion during extremely high flows. It is also noted on the contour map that as one continues southward from the point where the dike has been breached, there are remnants of old stream channels which flow down to the Weaver Creek corridor and provide an avenue for River water flowing over the dike to flow into Weaver Creek.

During the field review it was also noted that the dike had been breached on the north side of the river at the confluence and approximately 500 feet upstream on the North Fork. During the

AREA 1: Photo from upstream of confluence looking easterly. Bank erosion and shift of South Fork to the south is circled on photo.

AREA 1: Close-up view looking easterly upstream from confluence. South Fork channel has shifted southerly, removing riparian area and eroding toe of dike. Dike was also breached during March 1997 event.

AREA 1: Photo of log jams at the upper end of gravel bar. View is looking northeasterly from across channel. Log jams are circled.

AREA 1: Photo of log jams at upper end of gravel bar.
View is easterly.

AREA 1: Photos show composition of easterly log jam at upper end of gravel bar.

Area 1: Close-up of most westerly log jam at upper end of gravel bar. View is easterly.

Area 1: Close-up of easterly log jam at upper end of gravel bar. View is easterly.

Area 3: Photo from spur dike looking northerly towards cliff and slide area.

AREA 3: Old car body at end of spur dike.

Area 2: Bank erosion. View from top of bank looking northwesterly.

AREA 2: Bank erosion. View from top of bank looking easterly.

Area 4: Photo where South Fork comes down from the canyon. River Channel has moved southerly, steadily eroding south bank. Photo looking northerly - upstream.

Area 4: Photo looking northeasterly from bank erosion area. Cliff and landslide area in background. River has moved southerly eroding bank area, then turns sharply and runs straight at the cliff which then turns it back southerly.

Area 3: Photo looking southwesterly at bank erosion area.

March 1997 flood event, water had flowed across the south end of Mr. Richert's field in this location and continued on to the east.

Area 2

The issue at Area 2 is bank erosion on the south bank, which has eroded away some private property. The channel has changed from where it is shown on the map. This change resulted from the March event. The channel is now flowing more directly against the south bank and has caused considerable bank erosion before continuing on around the bend.

Area 3

The first issue the County had at this location was that the property owner, Mr. Jerry Richert, has applied for a permit to reestablish a spur dike that he had constructed previously, and which has eroded away at the end. It had also been reported that he may have already started re-establishment of this dike; however, there was no evidence that any work had been done to it recently.

The second issue is the bank erosion on the west bank. The property owners on the west bank would like something done to stop this erosion. They have objected to Mr. Richert's application to reestablish his spur dike because they fear additional erosion of their property will be the result. We witnessed that the river is definitely eating away at the west bank, however, there has also been erosion of the spur dike on the opposite side of the river.

Area 4

The river at this location has eroded the south bank and the channel has also shifted to the south. Mr. Parsons, the owner, indicated that the river had consumed as much as 200 feet of his bank in the last several years. As the river shifts south it also has a more direct alignment aimed at the large cliff just to the east. This cliff is reported to have had recent landslides, which were evident to us from the appearance of the scarp. The material had slid down into the South Fork, reportedly even damming it for some number of hours before the water broke through and carried the slide material on downstream.

3.0 Geomorphic Analysis

The lower South Fork and upper Skokomish River is located downstream of the mountains of the upper watershed flowing over an alluvial plain. In this zone of the river system, the coarser sized sediments eroded and transported from the upper watershed tend to deposit on the bed of the river because the slope of the river is flatter in this reach compared to upstream (Figure 3.1). As the slope becomes flatter in the downstream direction, the velocity decreases (Figure 3.2) thereby decreasing the energy of flow and its sediment transport capacity (Figure 3.3). The bed of the river in this area responds by aggrading as the coarser sizes of sediment tend to deposit. Over time, the channels capacity to convey flow decreases causing more frequent flooding and a tendency for the channel to erode banks enlarging the channel size or even to shift position seeking new alignments or paths to convey the flow.

Skokomish River Profile

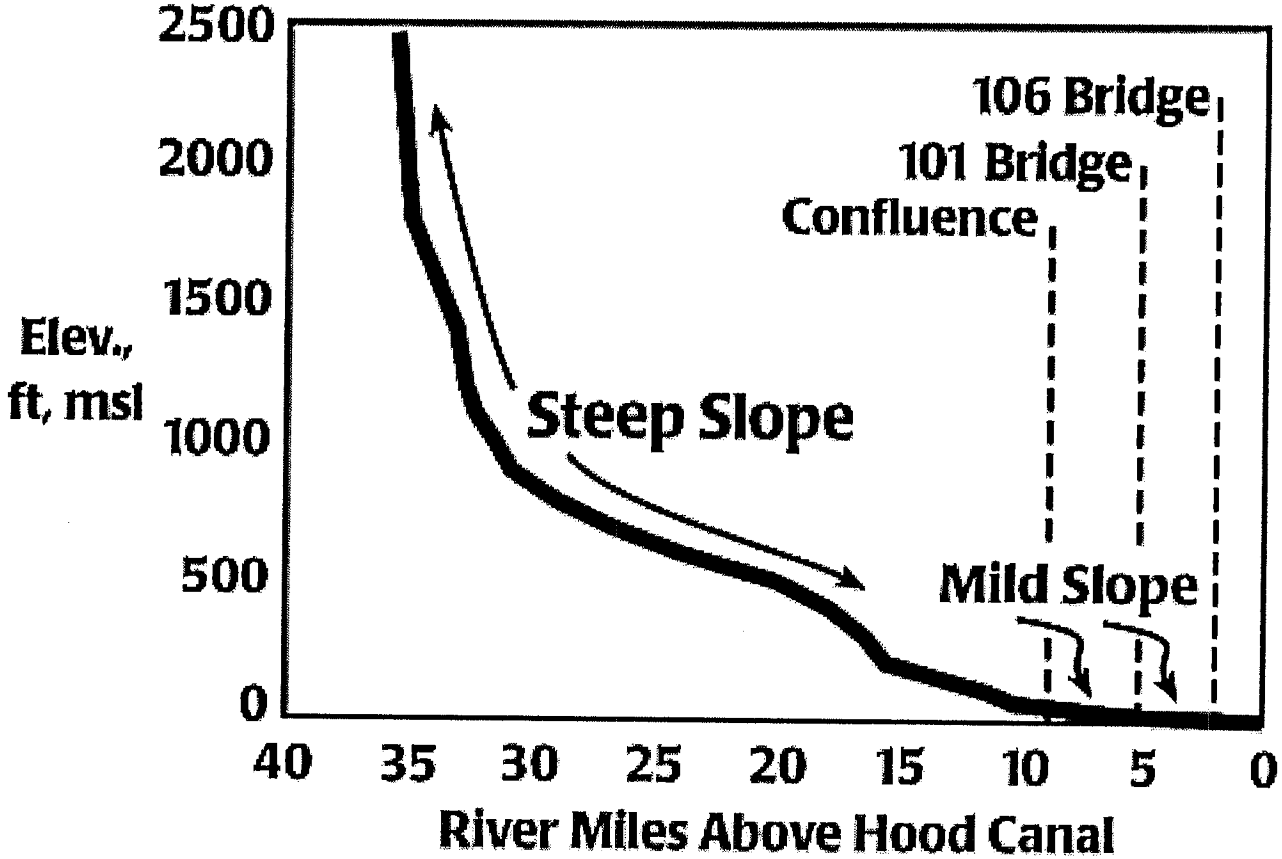
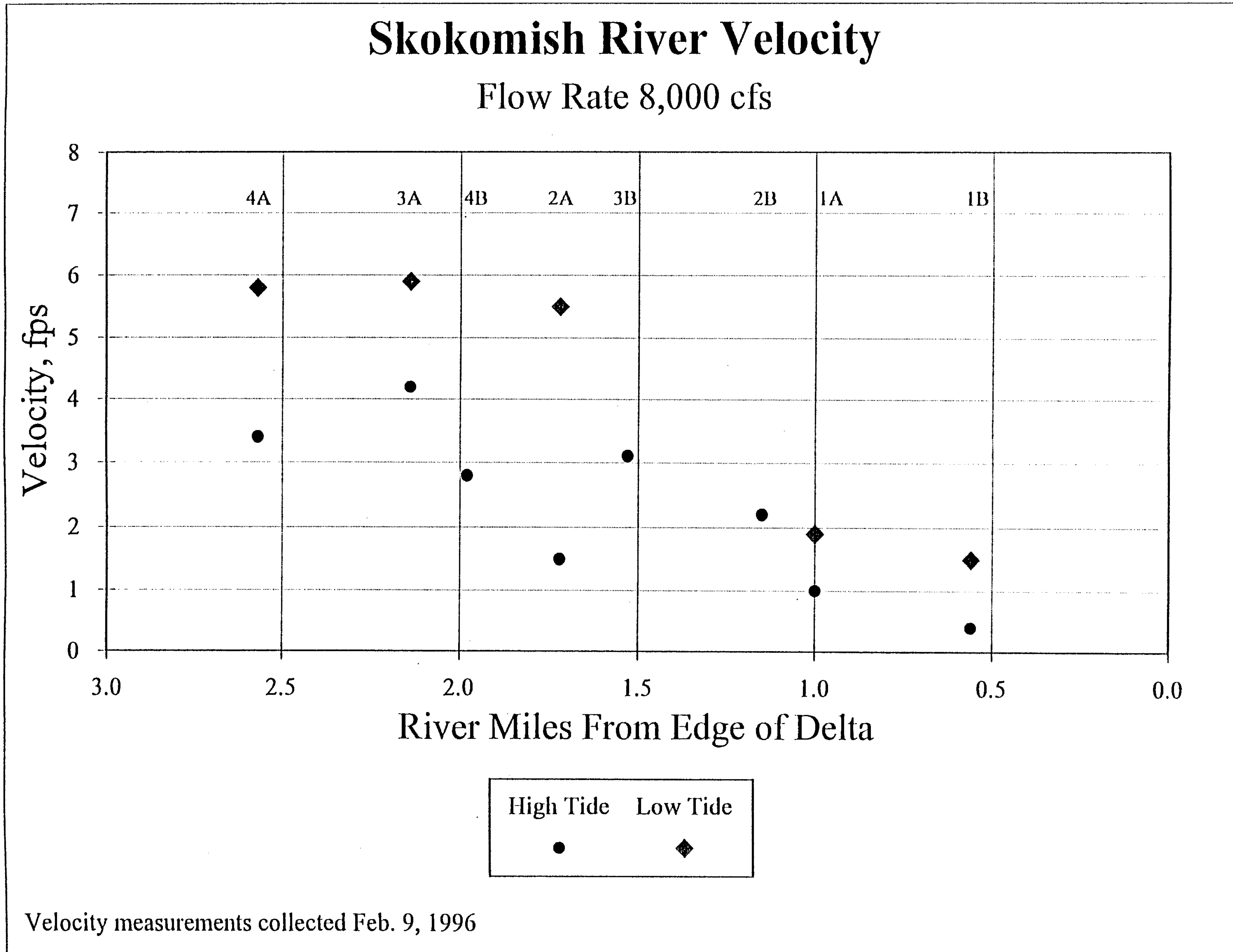


Figure 3.1

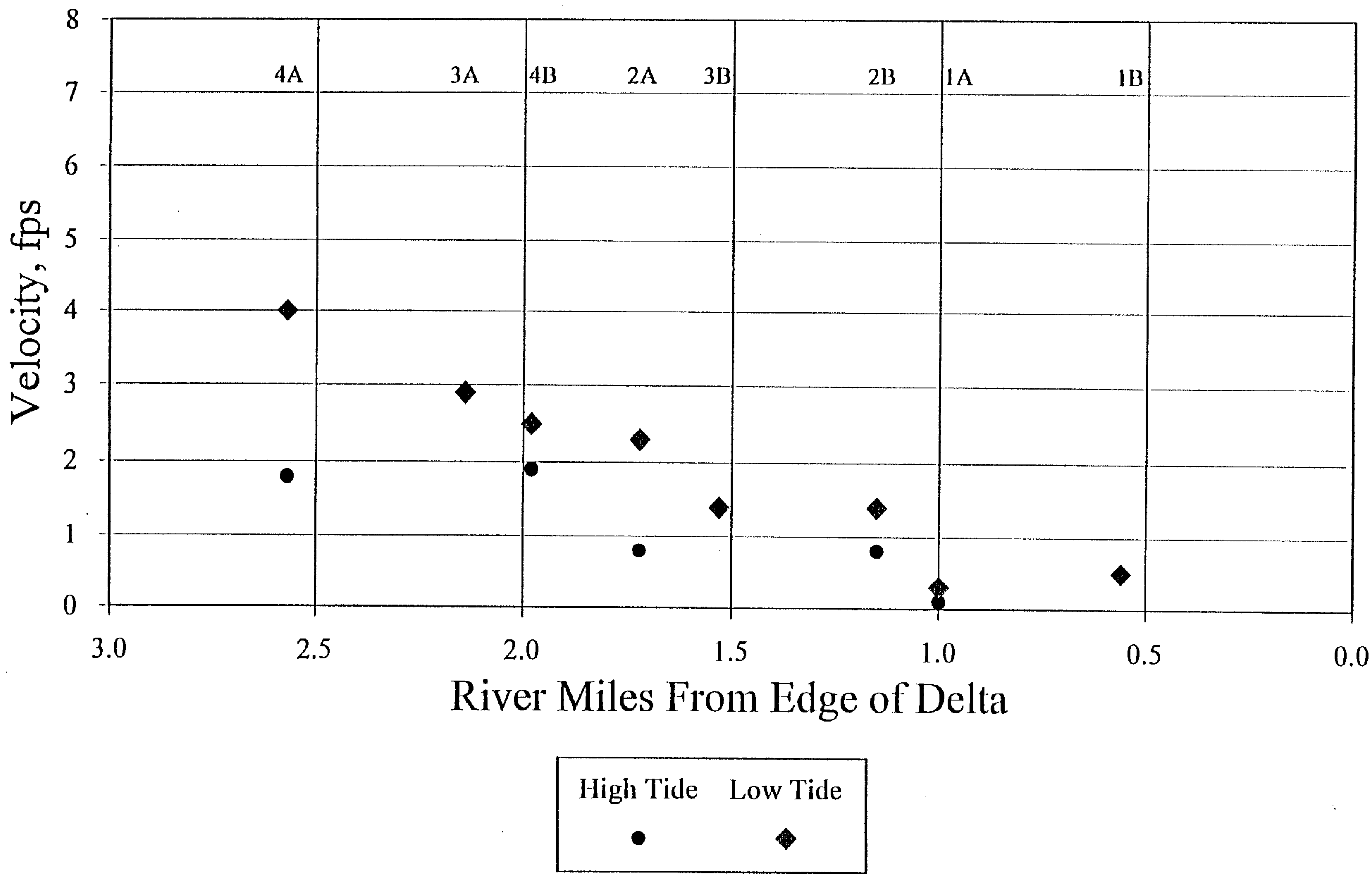


Skokomish River Velocity
Flow Rate 8,000 cfs
Velocity, fps
River Miles From Edge of Delta
4A
3A
4B
2A
3B
2B
1A
1B
0
1
2
3
4
5
6
7
8
3.0
2.5
2.0
1.5
1.0
0.5
0.0
High Tide
Low Tide
Velocity measurements collected Feb. 9, 1996

Figure 3.2a

Skokomish River Velocity

Flow Rate 1,500 cfs



Velocity measurements collected Nov. 14-18, 1995

Figure 3.2b

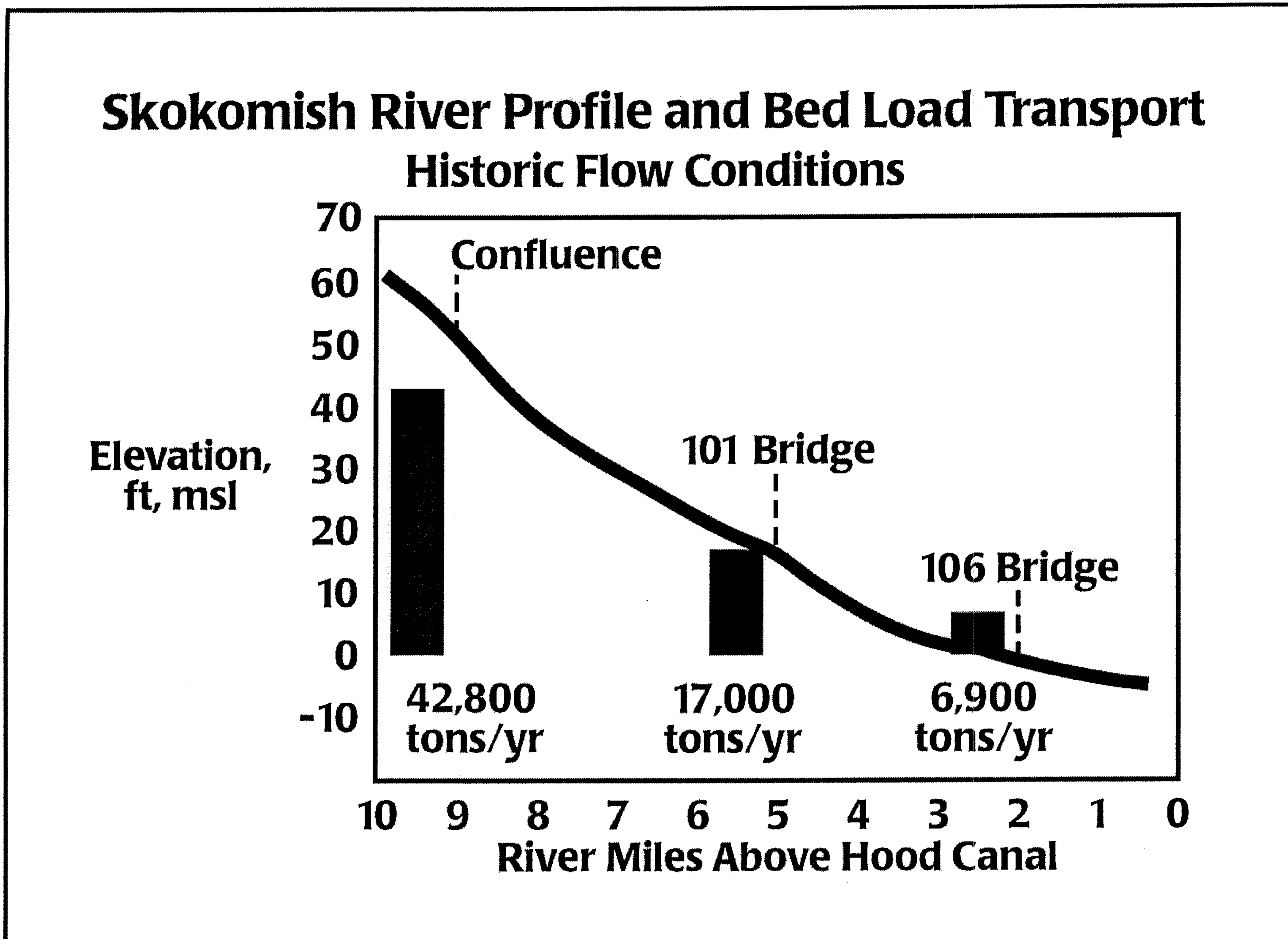

Skokomish River Profile and Bed Load Transport
Historic Flow Conditions
Elevation, ft, msl
70
60
50
40
30
20
10
0
-10
Confluence
101 Bridge
106 Bridge
42,800 tons/yr
17,000 tons/yr
6,900 tons/yr
10
9
8
7
6
5
4
3
2
1
0
River Miles Above Hood Canal

Figure 3.3

While the tendencies described above are the natural tendencies of the Skokomish River system, they have been exaggerated or have become more obvious in recent years for a variety of reasons. Sediment loads from the South Fork and Vance Creek portions of the watershed have increased substantially from about the late 1940's to the present time as large-scale logging has occurred along with associated roads.

It is important to note that the Skokomish River historically has flooded and has experienced dynamic behavior. Prior to the Cushman Project, built in the 1920's, the Skokomish River experienced significant flooding. The Washington State Department of Ecology (1988) stated:

> *"The Skokomish Valley has always flooded, and this has been a problem since settlement of the area by Caucasians and formation of the Skokomish Indian Reservation in the late 19th Century."*

In comparing the Skokomish to other similar rivers in the Pacific Northwest and specifically mentioning that the Skokomish was typical of such streams, the Department of Ecology in the same report stated:

> *"Historically, the lowland reaches of the larger Pacific Northwest rivers were characterized by multiple channels, numerous sloughs and old side channels, and an abundance of snags and log jams in the channels. Stream flow through the multiple channels was sluggish, and during the winter rainfall and spring snowmelt seasons, the river's flow regularly over topped the channel banks and spread across the entire floodplain for days or weeks at a time, if not the season."*

Older maps of the Skokomish valley, accepted by the Surveyor General in 1861, show significant areas of the floodplain adjacent to the river to be a marshy or wetland type of an area.

Recent aerial photographs, despite agricultural activity and other development, still show evidence of some historic channels on the floodplain. This indicates that the river has shifted alignment over time. Again, this dynamic shifting nature of the Skokomish River is a natural tendency as explained in the literature (Schumm, 1977), a well known geomorphologist, when he stated:

> *"Frequently environmentalists, river engineers, and others involved in navigation and flood control consider that a river should be unchanging in shape, dimensions and pattern. This would be very convenient. However, an alluvial river generally is changing its position as a consequence of hydraulic forces acting on its bed and banks."*

In an attempt to reduce flooding, it was reported by Sedell (1982 and 1984) and others that:

> *"Soon after settlement by Caucasians, a program of river snagging was begun by agriculturalists, and later institutionalized by the U S Army Corps of Engineers,*

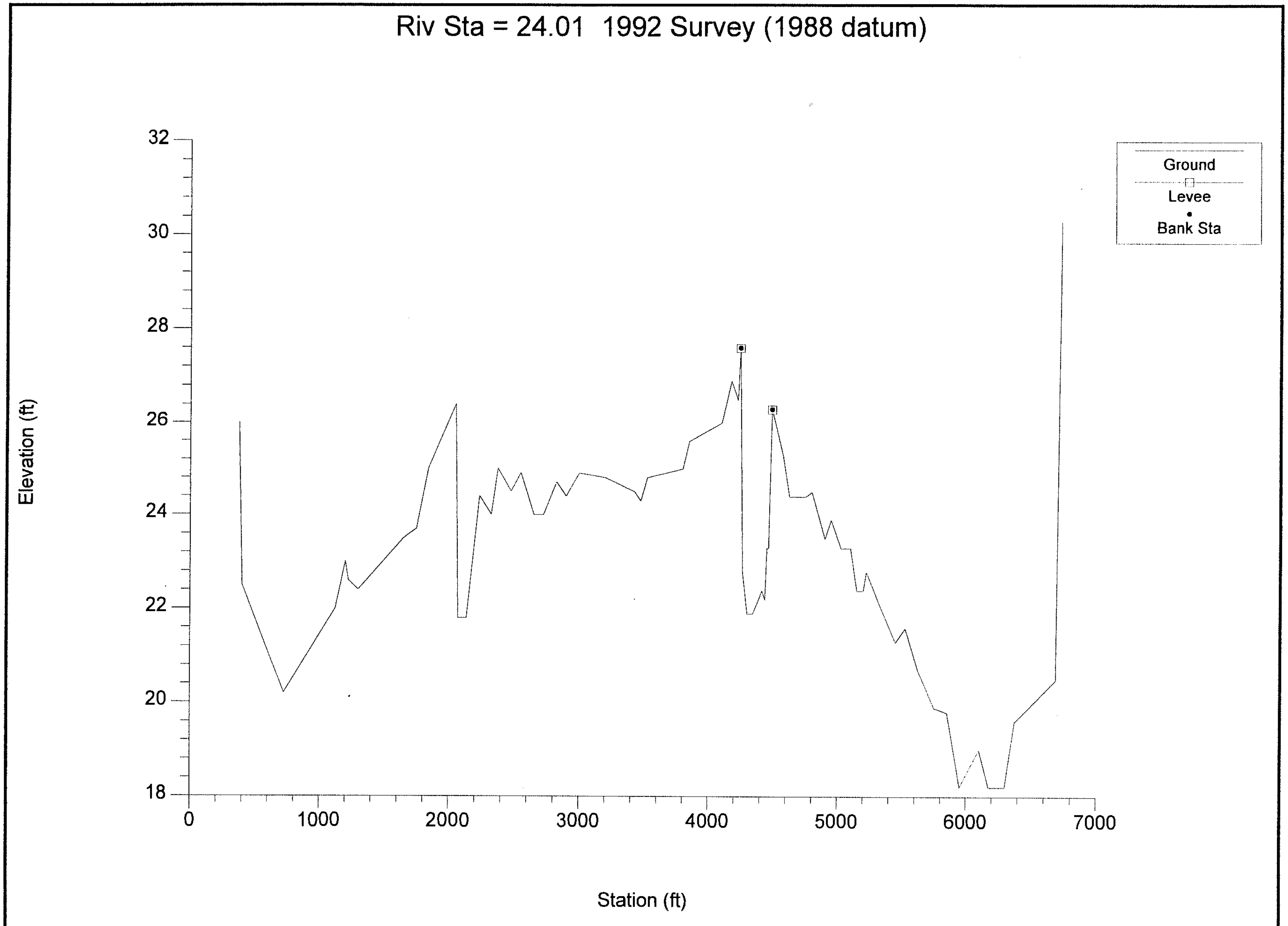
to hasten the drainage of peak flows and drain the floodplain land for agriculture."

In addition, dikes were also constructed along the river and the delta area to reduce inundation of the land surface. These statements demonstrate that flooding along the Skokomish River is **not** an issue of relatively recent origin but instead is a natural phenomenon which has occurred historically.

As a result of diking and general development of the floodplain, coupled with the flood control provided by the Cushman Project, residents of the valley from the 1920's through fairly recent decades did not have to contend with the amount of flooding described for historic conditions. With the natural aggradational trend and increased sediment load, these flood control benefits have been gradually diminishing to the point today where flooding has become quite common and may be approaching the historic flooding conditions which could be characterized as chronic and extensive. In addition, the Skokomish River and South Fork are on the threshold of potentially major avulsions, or in other words, major shifts of channel alignment. What is now floodplain could become a new path for the river. Existing channel segments could be abandoned. There are several strong indications for such potentially major avulsions. The Skokomish River system is perched as shown in Figure 3.4. In other words, the channel is at a generally higher elevation than the surrounding floodplain. Note that the shaded areas represent what is termed ineffective flow area according to those who prepared the cross-section data for hydraulic analysis. Perched channels are inherently unstable, and if the banks are breached the river may simply adopt a new path on the existing floodplain. The gradient across the valley floor in some cases is larger than the gradient downstream. The path of least resistance for water is often the steepest. The general cross valley slope or gradient for the upper Skokomish and lower South Fork tends to be to the south. Thus, the floodplain to the south of the river is particularly vulnerable. During the floods of the 1996/1997 season, there were several overflow paths which flowed to the south from the river. During the site visit there remains one actively flowing channel leaving the Skokomish and flowing toward the south even at relatively low flow. Although this channel turns down valley and returns to the Skokomish, it is a strong indication of the potential for a more significant avulsion and creation of a new channel.

Some discussion was previously presented in association with proposed gravel traps to reduce coarse sediment supply and aggradation. This discussion is reproduced here to assist in understanding the serious nature of the issues.

In evaluating the benefits of the proposed sediment traps in contrast with potential adverse consequences, several concepts should be considered. Not trapping the upstream coarse sediment load to control aggradation will result in a number of adverse consequences. Data show that the historic aggradation has decreased the bankfull conveyance capacity of the Skokomish River (Evaluation of the data has shown that the natural trend of aggradation in the Skokomish River has been accelerated primarily by the increase in sediment supplied to the river due to such activities as timber harvesting and building of roads in the contributing subwatersheds). This aggradational trend means that the river



Riv Sta = 24.01 1992 Survey (1988 datum)
Elevation (ft)
Station (ft)
Ground
Levee
Bank Sta
32
30
28
26
24
22
20
18
0
1000
2000
3000
4000
5000
6000
7000

Figure 3.4

conveys progressively smaller flows within its banks resulting in increased overbank flooding and decreased total quantity of water which flows within the banks of the river which is needed for the fish. Eventually, as the channel capacity continues to decrease, assuming no sediment control action is taken, the channel will experience significant avulsions, probably during a flood event. The old channel, or portions thereof, will be abandoned and new channels will be formed in the flood plain. There may be a period of a number of years when the water is forced out of the existing channel and will flow in an ill-defined path over the flood plain until a new channel is formed. While this is the dynamic nature of channels in the deposition zone of the fluvial system, this will result in a call for action which will be very expensive and quite disruptive to those who live along the river, as well as to the fish who live in the river. A decision needs to be made whether it is better to attempt to maintain the existing river channel by trapping coarse sediment as proposed or to deal with the consequences of not trapping the sediment when the river experiences avulsions. Of course, other options exist including large-scale dredging of the entire river on a periodic basis, extending/strengthening/raising of existing dikes in response to increases in bed elevation, long-term sediment supply reduction through watershed management practices, or more permanent sediment trapping facilities, however, these options are either more environmentally disruptive, more expensive, or require more time to become effective than the sediment traps which have been proposed for consideration.

4.0 Comparison of Cross-Sections 1992-1997

Cross-sections surveyed in 1992 were relocated in 1997 and re-surveyed. Figures 4.1 through 4.5 compare changes which have occurred over this time period. It should be noted that the datum used for these graphs is the 1929 datum. The graphical comparison of cross-sections shows a general trend of aggradation from 1992 to 1997. This is most easily seen by focusing on the main channel and thalweg of each survey. For most of these cross-sections there is evidence of on the order of a couple of feet of aggradation since the 1997 main channel and thalweg tends to be a couple of feet higher than in 1992. The flow of water within the banks of the main channel would then tend to be a couple of feet higher than it was in 1992. This represents a fairly significant trend in aggradation since this approximate two foot change occurred over a period of 5 years, whereas, at the Highway 101 bridge over a period of about 40 years there has been about 4.5 feet of aggradation. It must be noted, however, that this recent higher rate of aggradation may not be representative of average trends over a longer period because of the higher than normal flows of last year. This apparent increased rate of aggradation is likely due to the high flows of 1996/1997 which had the energy to move large quantities of sediment down from the sediment production zone in the upstream watershed and deposit it in the lower South Fork and upper Skokomish Rivers. Also, some large banks of sediment eroded on the South Fork, apparently of sufficient magnitude to temporarily block the river bringing significant quantities of sediment into the active channel of the South Fork.

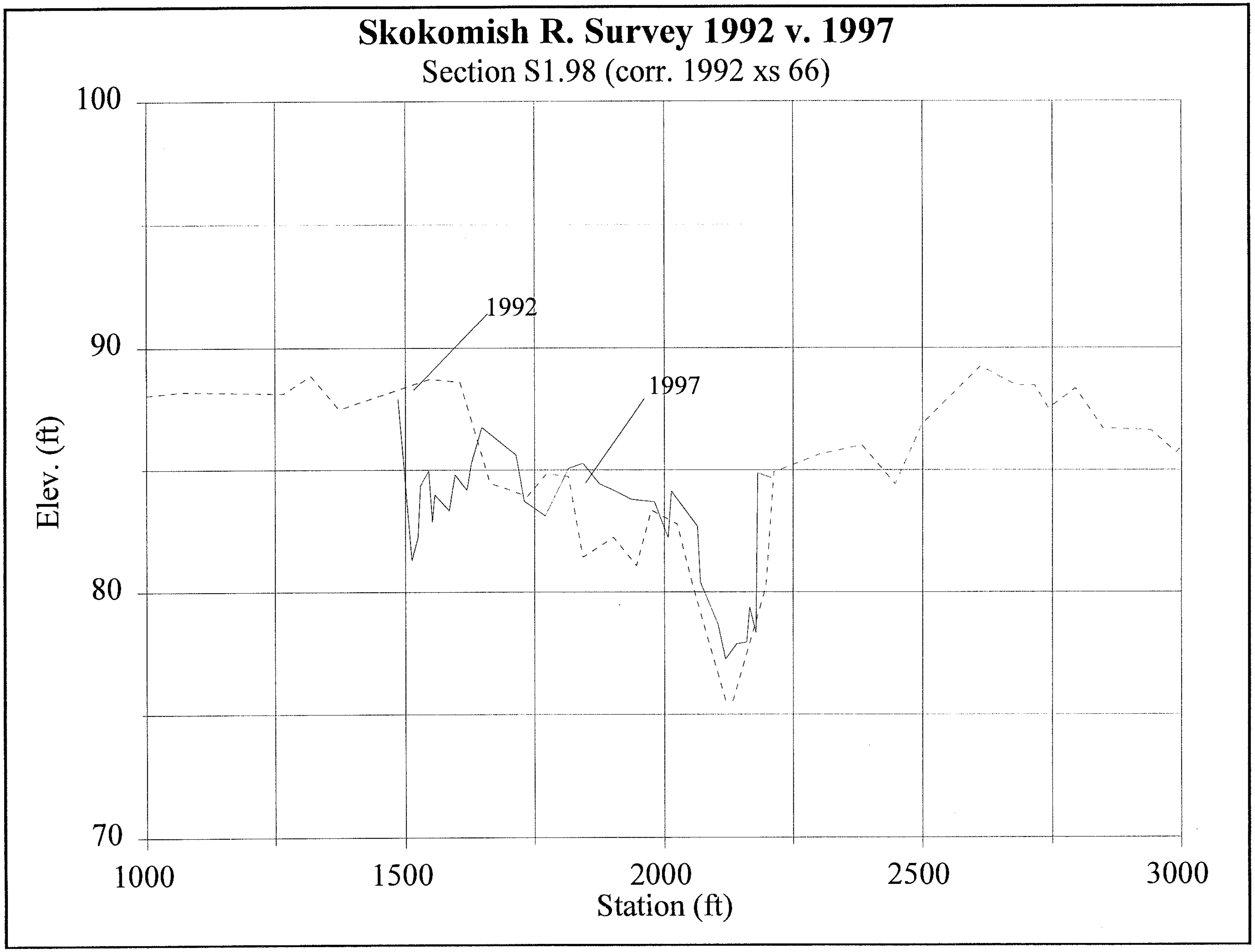

Skokomish R. Survey 1992 v. 1997
Section S1.98 (corr. 1992 xs 66)
Elev. (ft)
100
90
80
70
1000
1500
2000
2500
3000
Station (ft)
1992
1997

Figure 4.1

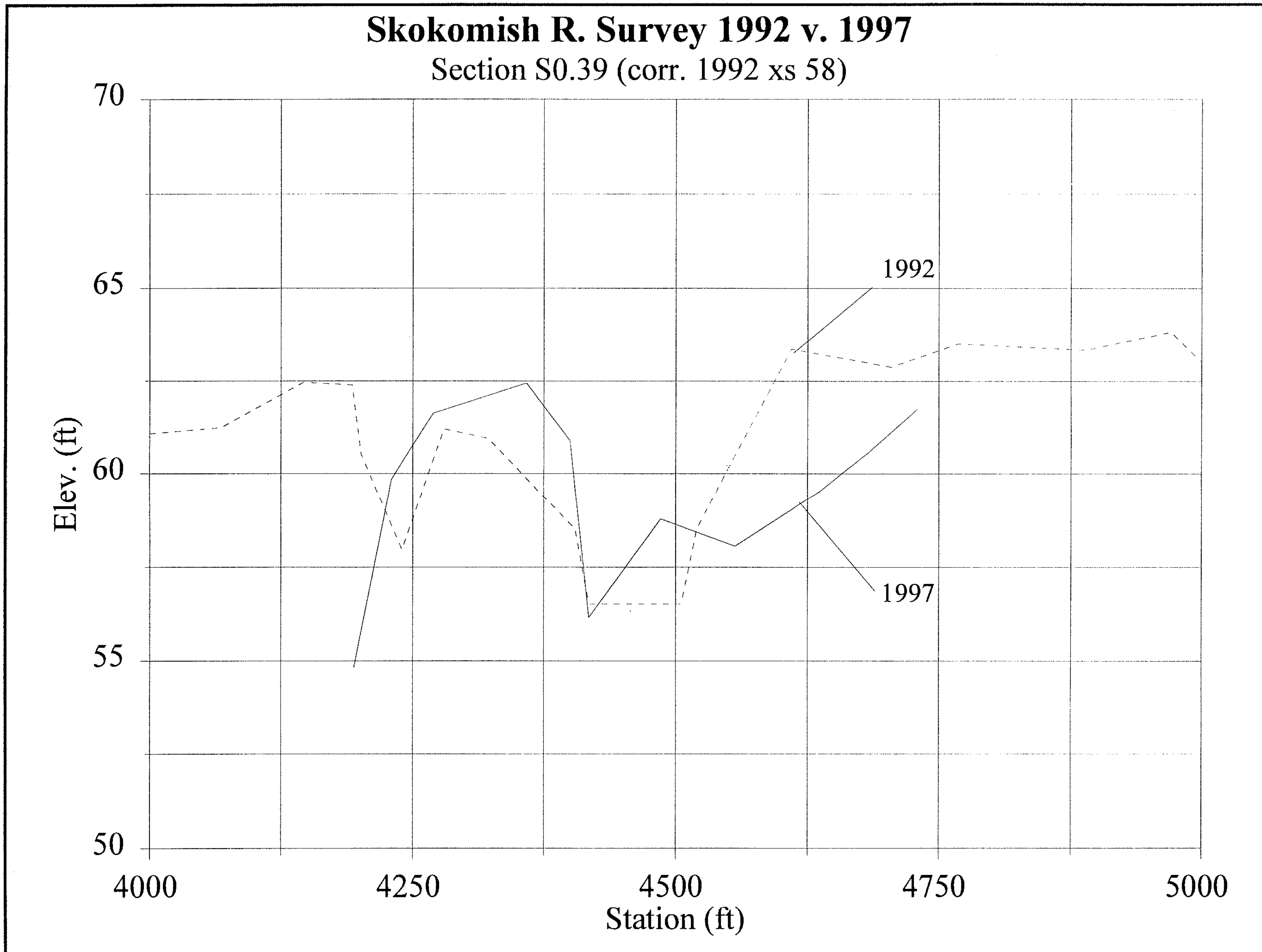

Skokomish R. Survey 1992 v. 1997
Section S0.39 (corr. 1992 xs 58)
70
65
60
55
50
Elev. (ft)
4000
4250
4500
4750
5000
Station (ft)
1992
1997

Figure 4.2

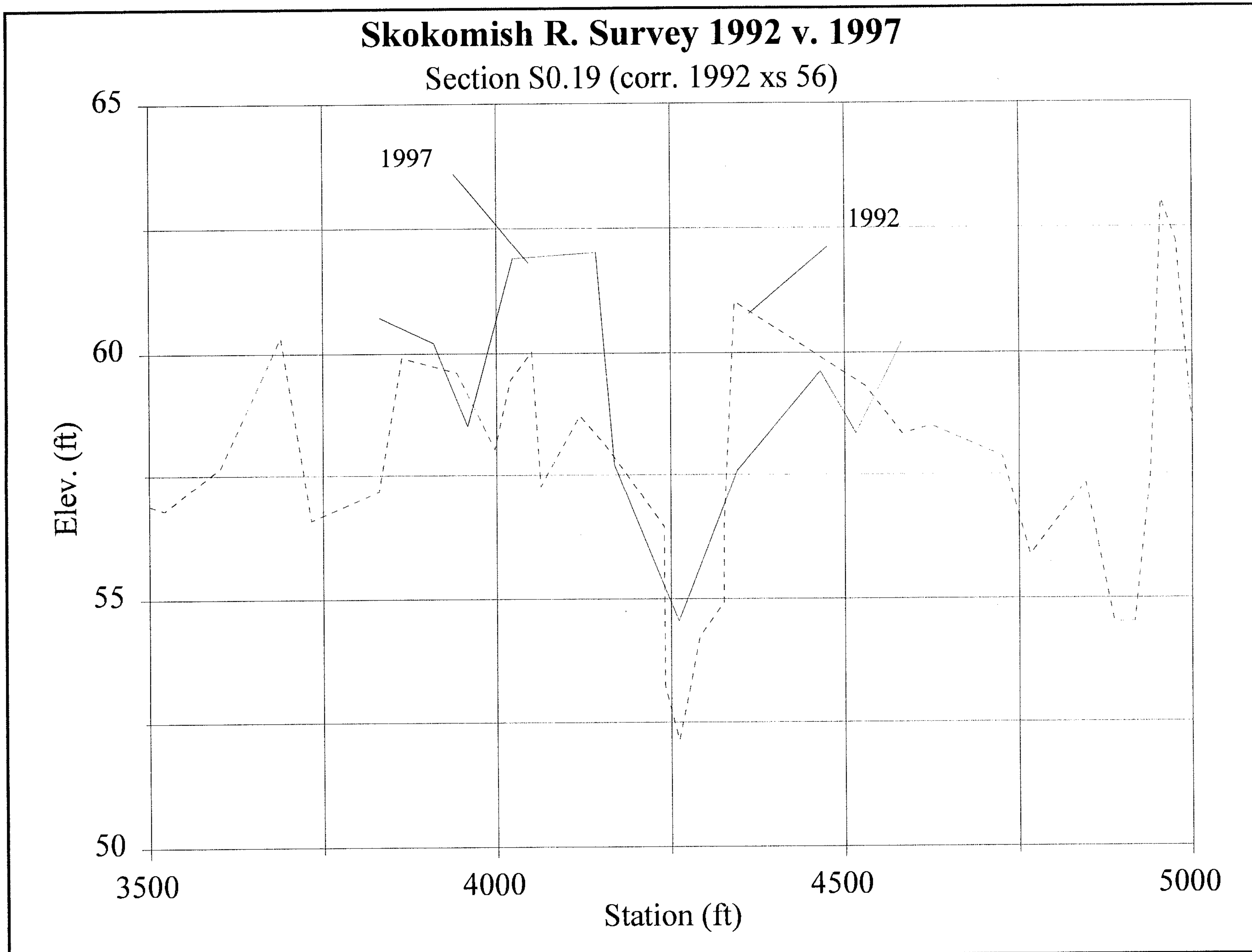

Skokomish R. Survey 1992 v. 1997
Section S0.19 (corr. 1992 xs 56)
65
60
55
50
Elev. (ft)
1997
1992
3500
4000
4500
5000
Station (ft)

Figure 4.3

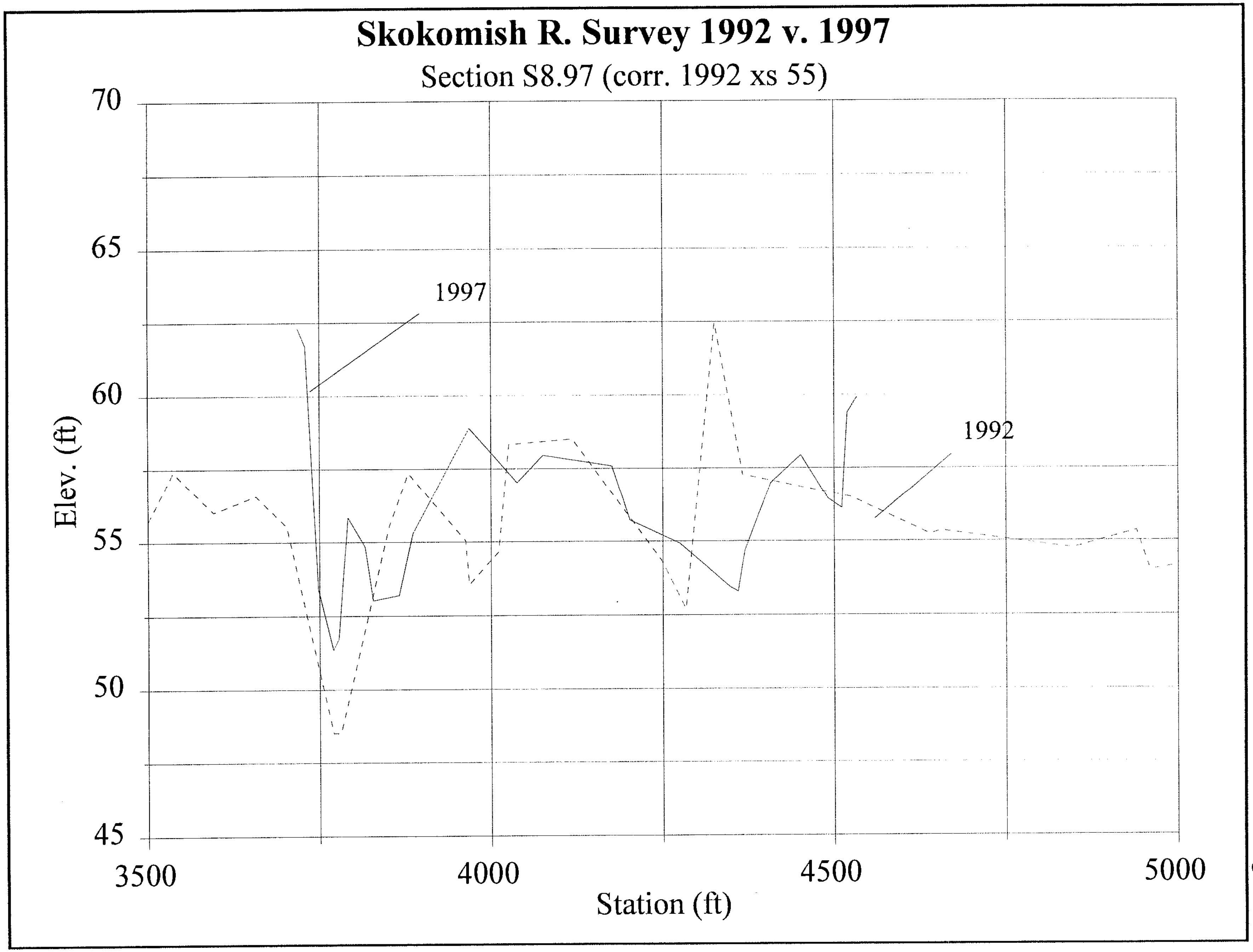
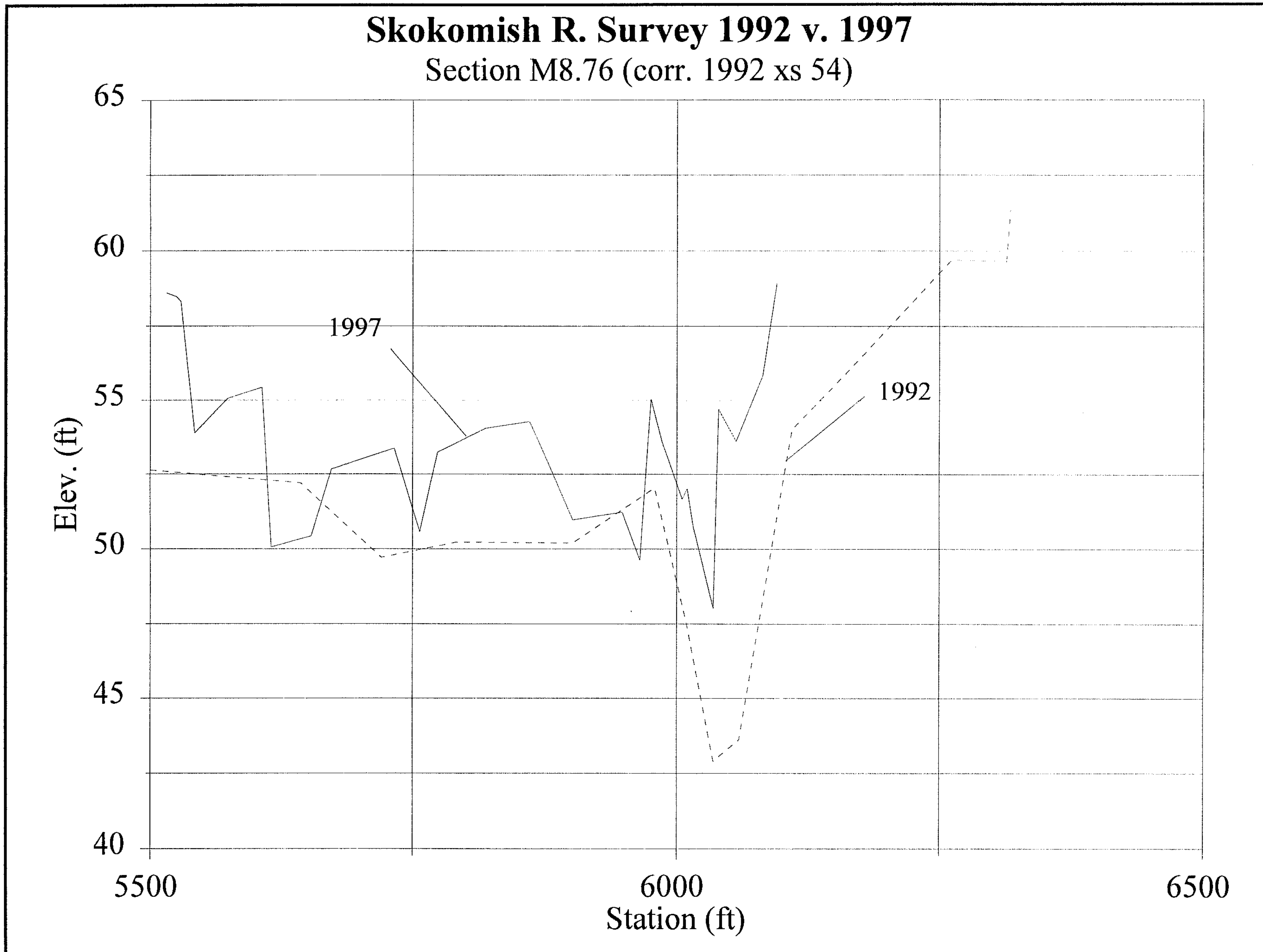

Skokomish R. Survey 1992 v. 1997
Section S8.97 (corr. 1992 xs 55)
70
65
60
55
50
45
Elev. (ft)
1997
1992
3500
4000
4500
5000
Station (ft)

Figure 4.4



Skokomish R. Survey 1992 v. 1997
Section M8.76 (corr. 1992 xs 54)
65
60
55
50
45
40
Elev. (ft)
1997
1992
5500
6000
6500
Station (ft)

Figure 4.5

The quantity of recent aggradation is a further indication of the dynamic conditions which exist on the lower South Fork and upper Skokomish River. The river is becoming more perched (higher with respect to the surrounding floodplain), and is therefore becoming less stable and more likely to change its course.

5.0 Hydraulic Analysis

Hydraulic analysis was conducted using both the 1992 data and the 1997 data. The water surface elevations for a flow of 2000 cfs were computed and the corresponding water surface profiles were plotted (see Figure 5.1). Again these are plotted based on the 1929 datum. The comparison shows that the 1997 profile is on the order of a couple of feet higher than the profile based on the previous data. Thus, the changes in the cross-sectional geometry have translated into higher water surface elevations from 1992 to 1997.

6.0 Recommendations

The following recommendations are made based on the observations and analysis presented above. The recommendations are divided into two parts, one for the short-term, and the other for the long-term.

<u>Short-term recommendations</u>

- Protect riverbanks against erosion in areas which experienced erosion in the 1996/1997 floods and towards which, the current of the river is directed. These locations are shown in Figure 6.1. They correspond to the four general areas previously discussed in this report in conjunction with the river inspection. Within these four general areas, more specific areas to be protected are indicated on the figure. Various levels of protection exist in these areas including some rock and cabled timber. Most of the existing erosion protection does not appear to be designed to withstand the forces of a significant flood event to appropriate engineering standards. To bring erosion protection at these locations up to appropriate engineering standards would require significant time and resources. If possible, it would be best to design and build erosion protection in these critical areas to such standards. If this is not possible and if rip-rap is not available, it is recommended to place readily available material, predominantly cobble sized (or larger), along these banks from the toe of the slope up to at least two-thirds the bank height. If the full bank height cannot be protected by rock, then supplementary cabled timbers should be added to complete the bank protection up to the top of bank. Areas that are currently protected by cabled timber should be reinforced by placing rock in void spaces between the timbers. Specific areas of erosion protection could be delineated but will require an additional trip to the field. It is suggested that after review and discussion of this report a field trip be made including Mason County, Renz, and Simons to stake out specific locations for the above recommendations.
- Construct spur dikes to push the main current of the river back where it had been prior to bank erosion which occurred during the 1997/1997 flood season. This will help protect the

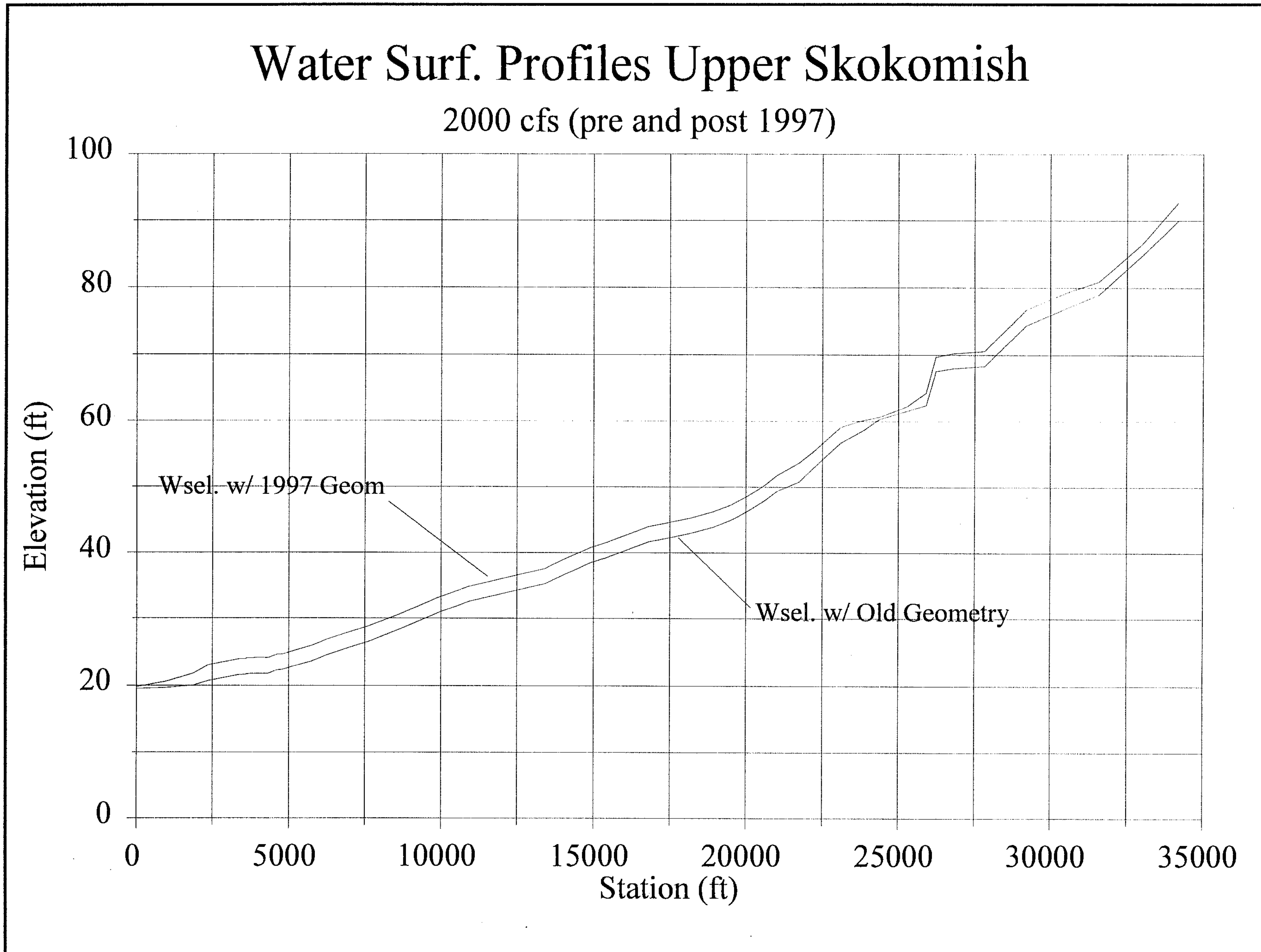

Water Surf. Profiles Upper Skokomish
2000 cfs (pre and post 1997)
100
80
60
40
20
0
Elevation (ft)
Wsel. w/ 1997 Geom
Wsel. w/ Old Geometry
0
5000
10000
15000
20000
25000
30000
35000
Station (ft)

Figure 5.1

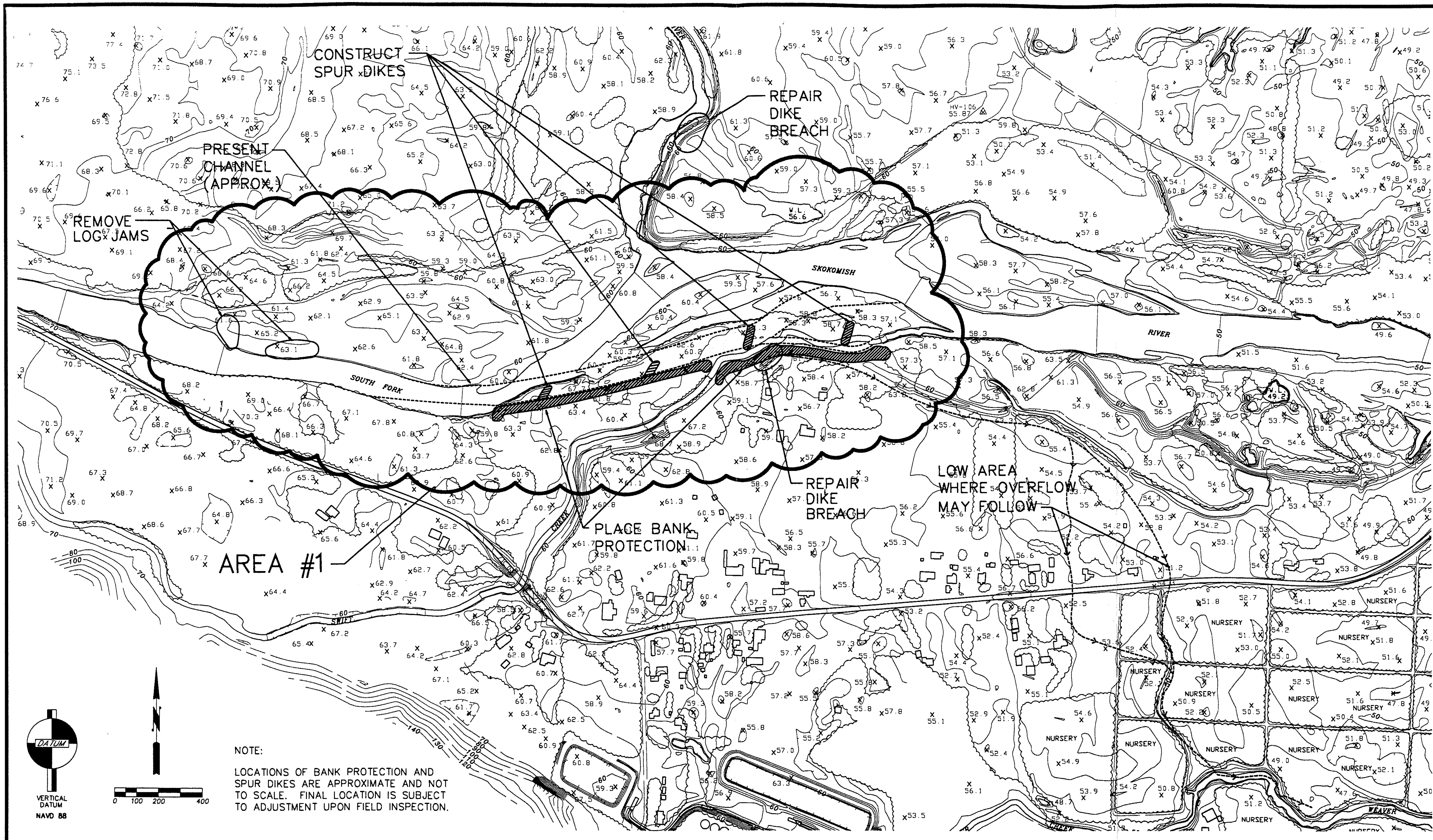
riverbanks and will encourage some sediment deposition to occur in areas where riparian land was lost due to erosion.

It should be noted that what we are recommending is spurs and not barbs. Barbs are typically placed in rivers on the outside of riverbends to reduce velocity. They are keyed into the bank and are constructed to a height of approximately 1.5 feet above low flow conditions. They are designed to be overtopped by high flows in the river, whereupon they perform as weirs, with the energy of the flow which flows over the barb projected at 90 degrees to the angle of the barb. They are also effective in reducing bank erosion on the bank from which they project, but they have significant increased effects on erosion on the opposite bank. Spurs on the other hand are usually designed to the full bank or dike height for which they are placed to protect. They can be attached or unattached to the bank, and the bank may or may not be protected with rip-rap. They are normally oriented downstream, but when several are used in sequence, the scheme is set with the upstream-most spur at approximately 150 degrees to the main flow at the spur tip, and with subsequent spurs having incrementally smaller angles approaching a minimum angle of 90 degrees at the downstream end of the scheme.

The primary criterion for establishing an appropriate spur orientation for the spurs within a given spur scheme is to provide a scheme that efficiently and economically guides the flow through the channel bend, while protecting the channel bank and minimizing the adverse impacts to the channel system. Spurs angled downstream produce a less severe constriction of flows than those angled upstream or normal to flow. The greater an individual spur's angle in the downstream direction, the smaller the magnitude of flow concentration and local scour at the spur tip. Also, the greater the angle, the less severe the magnitude of flow deflection towards the opposite channel bank.

Design details associated with these spurs, including specific locations, are best performed in the field by persons experienced in these techniques. Specifics of the spur dikes would be developed in the field visit discussed above.

- Repair any breaches in the existing dikes as shown in Area 1, as well as the breach on the North Fork and any other breaches which may be known to the County in the area of immediate concern. Protect these areas with rock or rock and cabled timber.
- Prepare and distribute a carefully worded statement to the residents living on the floodplain of the Skokomish River and North and South Forks warning of potential dynamic river behavior and encouraging them to purchase flood insurance and to take flood protection measures such as raising houses.
- Implementation of the proposed point bar and instream gravel traps.
- Stabilization of the toe of slopes subject to large-scale mass wasting such as the one on the north bank upstream of the old spur dike on the Richert property.
- Removal of obstructions in the existing channel in Area 1, specifically the two logjams at the upper end of the gravel bar just upstream of the confluence, as well as other significant obstructions.



		DATE	REVISIONS		CONTRACT NO.
DESIGNED BY:	L. RENZ	8/97	NO.	DATE	97014-1
ENTERED BY:	K. KIMMEL	8/97			
CHECKED BY:					
PROJ. ENGR.:					

DWG# D7014R2 Xref: Z-24X36B, Z7014BM2, 08/14/97 15:58 T. NGUYEN

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SKOKOMISH RIVER

SKOKOMISH WA

RECOMMENDATIONS FIGURE 6.1(A)

APPROVAL FOR CONSTRUCTION

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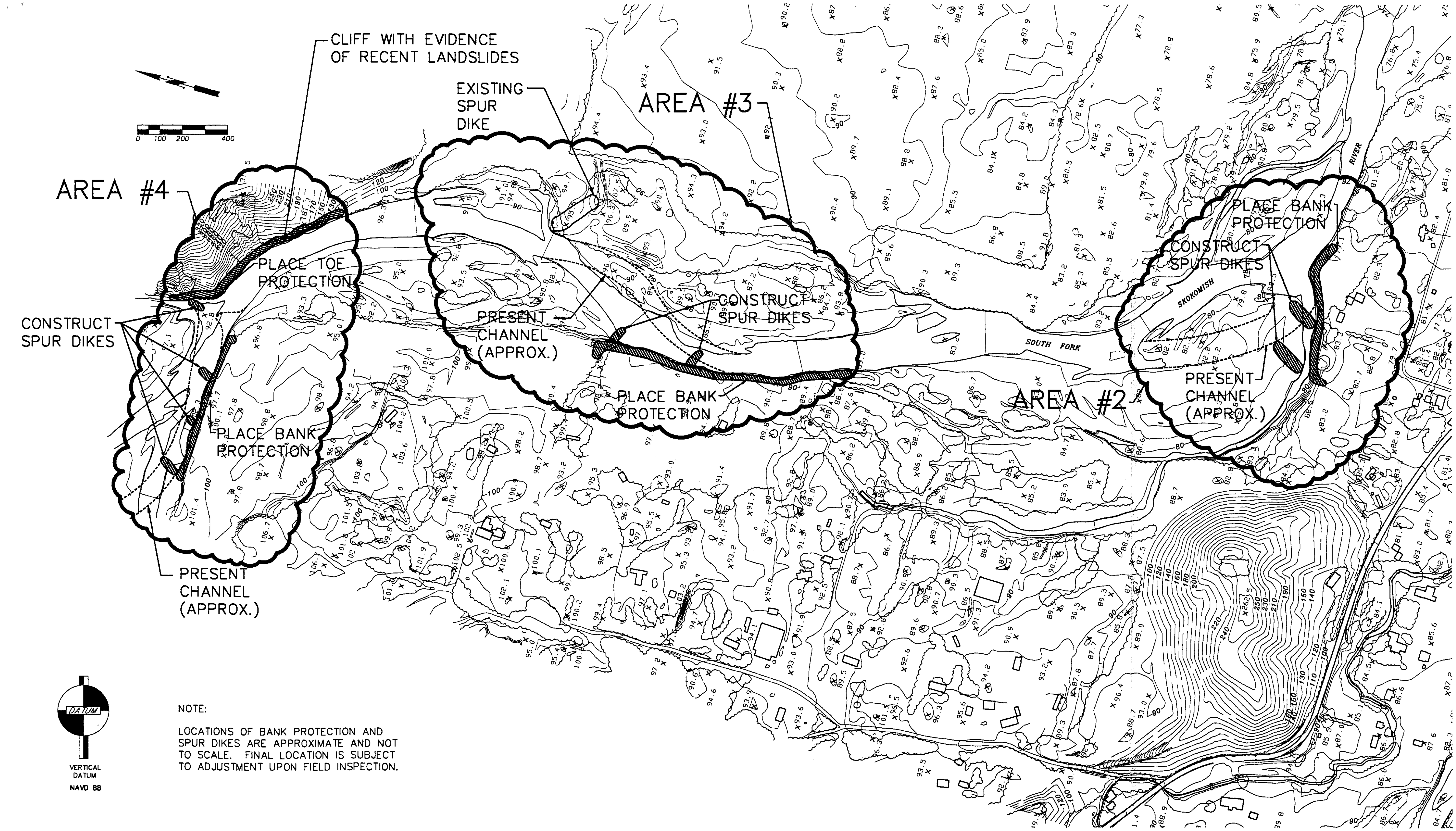
JOB NUMBER 97014-1

SHEET 1 OF 2 SHEETS



NOTE:

LOCATIONS OF BANK PROTECTION AND SPUR DIKES ARE APPROXIMATE AND NOT TO SCALE. FINAL LOCATION IS SUBJECT TO ADJUSTMENT UPON FIELD INSPECTION.

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SKOKOMISH RIVER

SKOKOMISH WA

RECOMMENDATIONS FIGURE 6.1(B)

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SHEET 2 OF 2 SHEETS

Long-term recommendations

- Watershed sediment control measures to reduce coarse sediment production and delivery.
- Analysis of trade-offs and cost-benefit of major alternatives such as dredging, continued coarse sediment trapping, continued buy-out of properties, flood control/sediment trapping facility on the South Fork compared to allowing the dynamic nature of the Skokomish River system to run its course and make necessary responses as the need arises.
- Implementation of best alternative(s).

It is necessary to understand that to maintain and control the Skokomish River in its current channel would require significant effort and expense over the long-term. To do so requires a major commitment to force the river into a fixed pattern and controlled behavior rather than to let it adjust its bed, banks, and alignment. Such an effort may not be feasible and the river may experience major change before any such commitments are developed and implemented. Remember that the Skokomish River, before significant development, was subject to significant channel change and extensive flooding. There has been a brief respite for several decades due primarily to flood control on the North Fork, but because of the tendency for sediment deposition as slopes and velocities decrease in the downstream direction and recent increases in sediment loading from the upstream watershed, the river is reverting to its historic dynamic and flooding conditions.