

APPENDIX A

Patient - Template Analysis. Landscapes of Key Habitat Quantity, Relative Productivity, and Environmental Attributes for each stream Reach Range.

Appendix A

This appendix includes summary information for each watershed from the Patient -Template Analysis. Narrative information summaries by watershed, maps identifying landmarks and described reach ranges within watersheds, and landscapes of Key Habitat Quantity, Relative Productivity, and Environmental Attributes for each stream Reach Range are included. Streams (and associated Reach Ranges) are listed below in alphabetical order, but are organized by subregion (clockwise around the canal) in the appendix.

The Key Habitat Quantity landscapes are presented with two levels of resolution: 1) the z-axis is scaled to the quantity of key habitat present in the individual watershed (i.e., 5 or 15 m²); and 2) the z-axis is scaled to the maximum quantity of key habitat present in all Hood Canal watersheds (30 m²).

<u>STREAM REACH RANGES</u>	<u>SUBREGION</u>	<u>PAGE</u>
<u>Anderson Creek</u> (WRIA 15.0412) Anderson Creek mainstem	East Hood Canal	A-107
<u>Big Beef Creek</u> (WRIA 15.0395) Big Beef Creek mainstem Tributary 15.0397/Big Beef Creek Tributary 15.0398/Big Beef Creek	East Hood Canal	A-67
<u>Big Mission Creek</u> (WRIA 15.0495) Big Mission Creek mainstem Tributary 15.0496/Big Mission Creek Tributary 15.0498/Big Mission Creek	South Hood Canal	A-148
<u>Boyce Creek</u> (WRIA 15.0407) Boyce Creek mainstem	East Hood Canal	A-94
<u>Dewatto River</u> (WRIA 15.0420) Dewatto River mainstem Tributary 15.0424/Dewatto River Tributary 15.0429/Dewatto River Tributary 15.0436/Dewatto River	South Hood Canal	A-114

Appendix A. continued (page 2 of 3).

<u>STREAM REACH RANGES</u>	<u>SUBREGION</u>	<u>PAGE</u>
<u>Donovan Creek</u> (WRIA 17.0115) Donovan Creek mainstem Tributary 17.0116/Donovan Creek Tributary 17.0118/Donovan Creek	North Hood Canal	A - 1
<u>Duckabush River</u> (WRIA 16.0351) Duckabush River mainstem	West Hood Canal	A - 225
<u>Gamble Creek</u> (WRIA 15.0356) Gamble Creek mainstem	North Hood Canal	A - 54
<u>Hamma Hamma River</u> (WRIA 16.0251) Hamma Hamma River mainstem Johns Creek/Hamma Hamma River	West Hood Canal	A - 214
<u>Harding Creek</u> (WRIA 15.0408) Harding Creek mainstem	East Hood Canal	A - 100
<u>Little Anderson Creek</u> (WRIA 15.0377) Little Anderson Creek/Tributary 15.0382	East Hood Canal	A - 61
<u>Miller Lake Creek</u> (WRIA 15.0353) Miller Lake Creek mainstem	East Hood Canal	A - 49
<u>Seabeck Creek</u> (WRIA 15.0400) Seabeck Creek mainstem	East Hood Canal	A - 82
<u>Skokomish River</u> (WRIA 16.0001) South Fork/Skokomish River mainstem Kirkland/Vance/South Fork/Skokomish River mainstem Vance/South Fork/Skokomish River mainstem North Fork/Skokomish River mainstem McTaggart/North Fork/Skokomish River mainstem	Skokomish River	A - 191
<u>Shine Creek</u> (WRIA 17.0181) Shine Creek mainstem	North Hood Canal	A - 43

Appendix A. continued (page 3 of 3).

<u>STREAM REACH RANGES</u>	<u>SUBREGION</u>	<u>PAGE</u>
<u>Stavis Creek</u> (WRIA 15.0404) Stavis Creek mainstem	East Hood Canal	A-88
<u>Tahuya River</u> (WRIA 15.0446) Tahuya River mainstem Haven Lake/Tahuya River mainstem Little Tahuya Creek/Tahuya River mainstem Twin Lake/Tributary 15.0460/Tahuya River mainstem	South Hood Canal	A-131
<u>Tarboo Creek</u> (WRIA 17.0129) Tarboo Creek mainstem Tributary 17.0130/Tarboo Creek	North Hood Canal	A-17
<u>Thomdyke Creek</u> (WRIA 17.0170) Thomdyke Creek mainstem Tributary 17.0171/Thomdyke Creek Tributary 17.0174/Thomdyke Creek	North Hood Canal	A-28
<u>Union River</u> (WRIA 15.0503) Union River mainstem Courtney Creek/Union River Tributary 15.0512/Union River Bear Creek/Union River East Fork Creek/Union River	South Hood Canal	A - 165

NORTH HOOD CANAL SUBREGION

<u>Stream Reach Ranges</u>	<u>Page</u>
<u>Donovan Creek</u> (WRIA 17.0115)	A-1
Donovan Creek mainstem	
Tributary 17.0116/Donovan Creek mainstem	
Tributary 17.0118/Donovan Creek mainstem	
<u>Tarboo Creek</u> (WRIA 17.0129)	A-17
Tarboo Creek mainstem	
Tributary 17.0130/Tarboo Creek mainstem	
<u>Thorndyke Creek</u> (WRIA 17.0170)	A-28
Thorndyke Creek mainstem	
Tributary 17.0171/Thorndyke Creek mainstem	
Tributary 17.0174/Thorndyke Creek mainstem	
<u>Shine Creek</u> (WRIA 17.0181)	A-43
Shine Creek mainstem	
<u>Miller Lake Creek</u> (WRIA 15.0353)	A-49
Miller Lake Creek mainstem	
<u>Gamble Creek</u> (WRIA 15.0356)	A-54
Gamble Creek mainstem	

Patient - Template Analysis Summary

Watershed: Donovan Creek

Reach Ranges: Three reach ranges are used to describe performance landscapes for this watershed. Each reach range begins at the mouth of the main stream and terminates at the upper most possible distribution of coho salmon, following a single contiguous drainage in the watershed.

Donovan Creek mainstem: 1.9 mi

This reach range consists of the mainstem of Donovan Creek, beginning at its mouth (entry into Hood Canal) and extending to the end of the anadromous zone at a waterfall (Fig. A.1).

Tributary 17.0116/Donovan Creek: 1.1 mi

This reach range consists of a portion of lower Donovan creek and continues upstream to the upper end of possible coho utilization in Tributary 17.0116. Tributary 17.0116 enters Donovan Creek on the left bank (LB) at RM 0.1 (Fig. A.1). The reach range continues 1.0 mi up this tributary to where the gradient exceeds 8%, considered to be the end of possible coho salmon utilization.

Tributary 17.0118/Donovan Creek: 2.0 mi

This reach range consists of a portion of lower Donovan Creek and continues upstream to the upper end of possible coho utilization in Tributary 17.0118. Tributary 17.0118 enters Donovan Creek on the right bank (RB) at RM 1.0. The reach range extends 1.0 mi up this tributary into Rice Lake (Fig. A.1). Coho utilization was considered to have extended into Rice Lake historically. A culvert (Center Rd.) near the mouth of Tributary 17.0118 may be a barrier under some flow conditions to coho salmon.

Key Habitat Quantity:

Watershed Summary

The overall quantity of key habitat for coho salmon in the Donovan Creek watershed is reduced from its historic (template) levels. Moderate to substantial loss has occurred, mainly in the lower reaches of mainstem Donovan Creek, for the fry colonization and overwintering life stages, and in Tributary 17.0118 during the summer rearing and overwintering life stages (Figs. A.2, A.4, and A.6). Relatively minor losses have occurred during other life stages. These losses are primarily attributed to timber harvest in the upper watershed and agricultural development in the lower watershed.

The quantity of key habitat for coho salmon in this watershed, relative to other watersheds in the Hood Canal basin, is very low under both current (patient) and historic (template) conditions (Figs. A.3, A.5, and A.7).

Donovan Creek mainstem

The quantity of key habitat for coho salmon is reduced from its historic levels, primarily due to a loss of some spawning/incubation habitat, and colonization and overwintering habitat (Fig. A.2). These changes are generally attributed to channel aggradation from increased sediment that have occurred in association with past timber harvest in the upper watershed, and agricultural development in the lower watershed.

Tributary 17.0116/Donovan Creek

Small losses in the quantity of key habitat for coho salmon have occurred in the Tributary 17.0116 reach range, particularly for the spawning and incubation life stages compared to historic levels (Fig. A.4). These losses are associated with channelization and ditching of the lower portion of the tributary reach. Most current spawning and incubation habitat is in the upper section of the tributary reach.

Tributary 17.0118/Donovan Creek

The quantity of key habitat for coho salmon in the Tributary 17.0118 reach range is slightly reduced from its historic levels, primarily due to a loss of summer rearing habitat (Fig. A.6). This loss is due to intermittent flows in some years. A culvert (Center Rd.) near the mouth of Tributary 17.0118 may be a barrier under some flow conditions to coho salmon.

Relative Productivity:

Watershed Summary

Relative productivity of coho salmon in the Donovan Creek watershed is reduced from its historic levels. Substantial reductions have occurred in the spawning, incubation, and fry colonization life stages in the lower mainstem and tributary reaches. The anadromous reaches of the mainstem creek and tributaries have been heavily impacted by increased sediment loads, channel aggradation, dredging and channelization, and flashy high winter flows, associated primarily with land use practices in the watershed. Lack of instream large woody debris and associated cover and habitat complexity characterizes many of the reaches in this watershed.

Donovan Creek mainstem

Relative productivity of coho in Donovan Creek mainstem has been most impacted in the incubation stage, but has also been reduced for colonizing fry

and overwintering juveniles (Fig. A.8). The related environmental attributes are: increased sediment load, reduced channel stability, reduced habitat diversity, and increased high winter flows (Fig. A.11). These were identified as problems associated with timber harvest in the upper watershed and agricultural practices in the lower watershed. The effect is most severe on coho productivity in the lower mainstem, where wetlands present historically have now been converted for agricultural uses, and where the sediment aggradation occurs in the channel due to the low gradient.

Tributary 17.0116/Donovan Creek

Relative productivity has been considerably reduced for spawning and incubation in the lower portion of tributary 17.0116 (Fig. A.9). This is due to reduced habitat diversity where ditching has occurred in a wetland area (Fig. A.12).

Tributary 17.0118/Donovan Creek

Relative productivity is greatly reduced in Tributary 17.0118 for the incubation, colonization, and overwintering life stages (Fig. A.10) due to increased high winter flows, increased sediment load and decreased channel stability, and loss of habitat diversity associated with reduced instream large woody debris levels (Fig. A.13). Also, in this reach range, low summer flows were identified as having a high effect on productivity of rearing juveniles. The area around this tributary and Rice Lake was intensively harvested about 10 to 20 years ago.

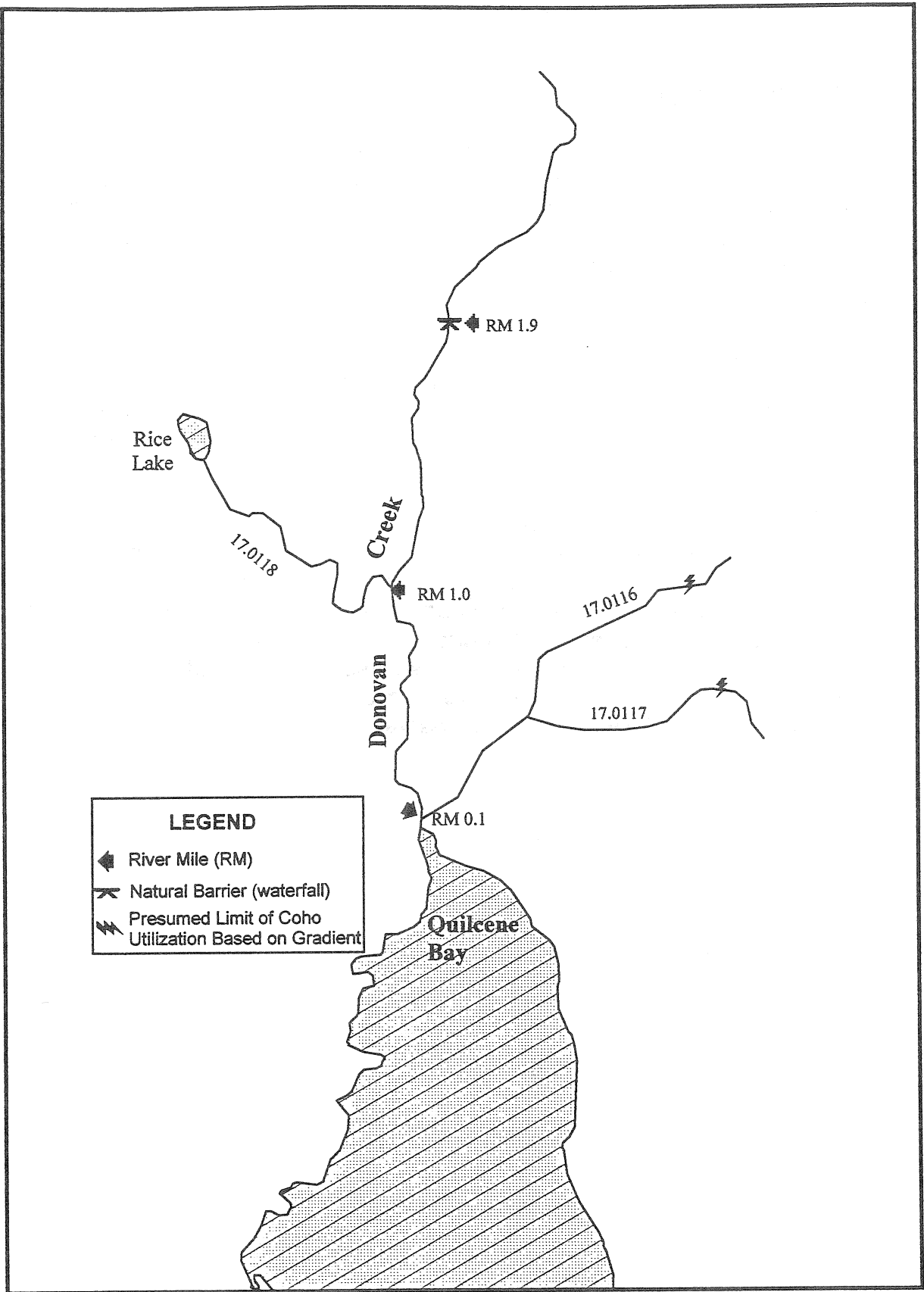
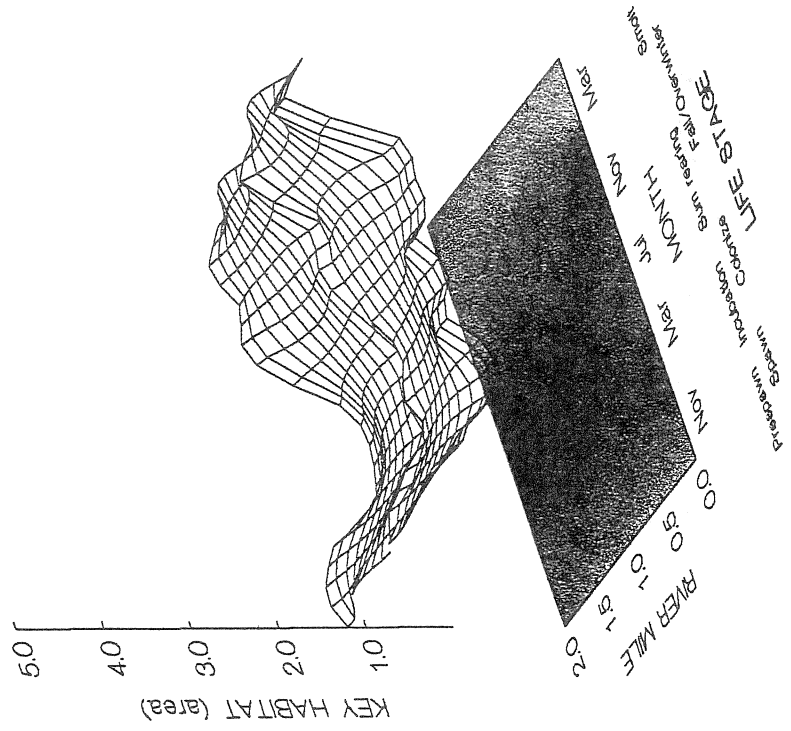


Figure A.1. Map of the Donovan Creek watershed (WRIA 17.0115).

Figure A.2. Patient and template landscapes of key habitat quantity for Donovan Creek mainstem reach range. The z-axis is scaled to 5 m² of key habitat.

Patient



Template

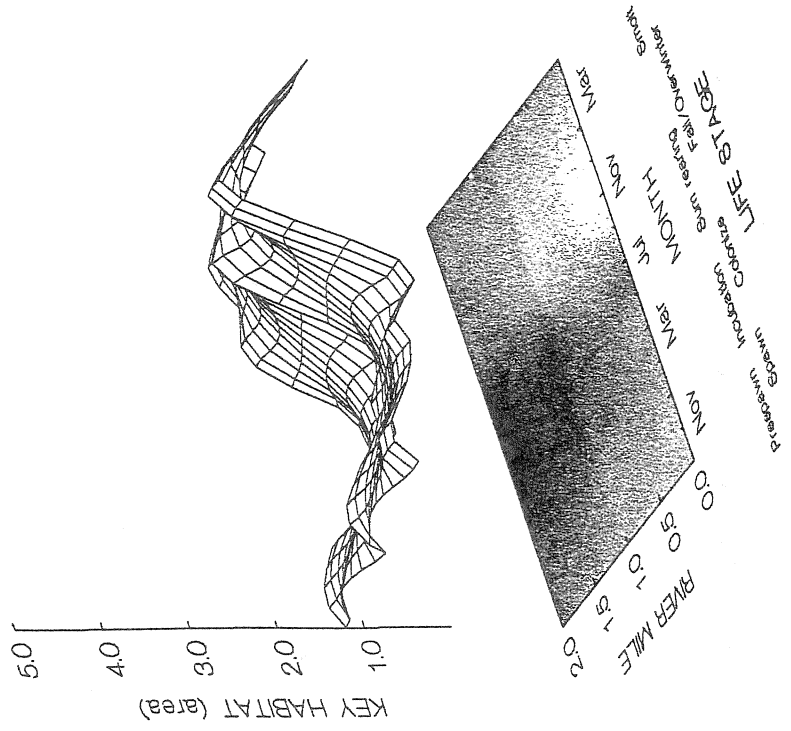
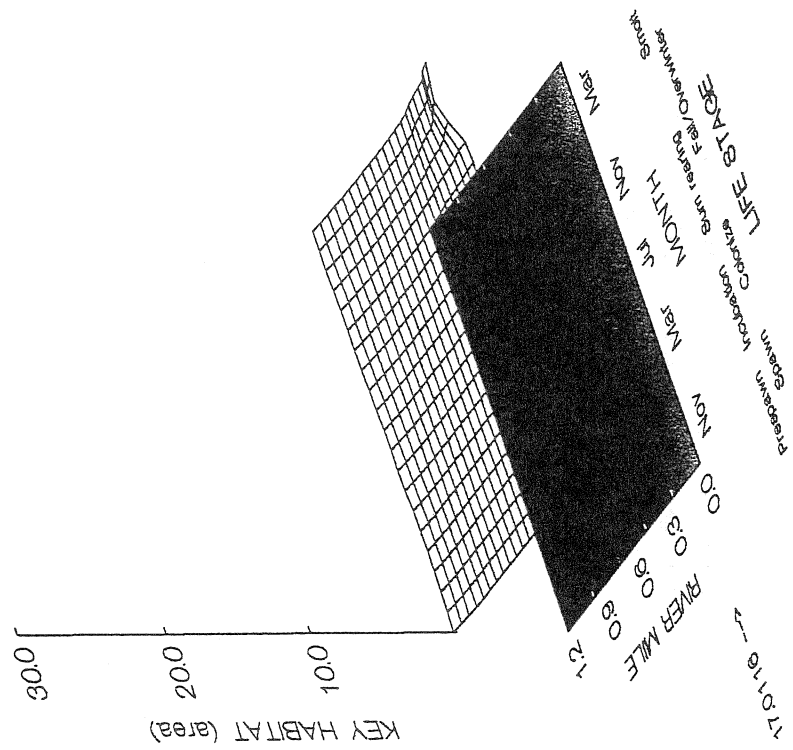


Figure A.5. Patient and template landscapes of key habitat quantity for Tributary 17.0116/Donovan Creek reach range. The z-axis is scaled to 30 m² of key habitat.

Patient



Template

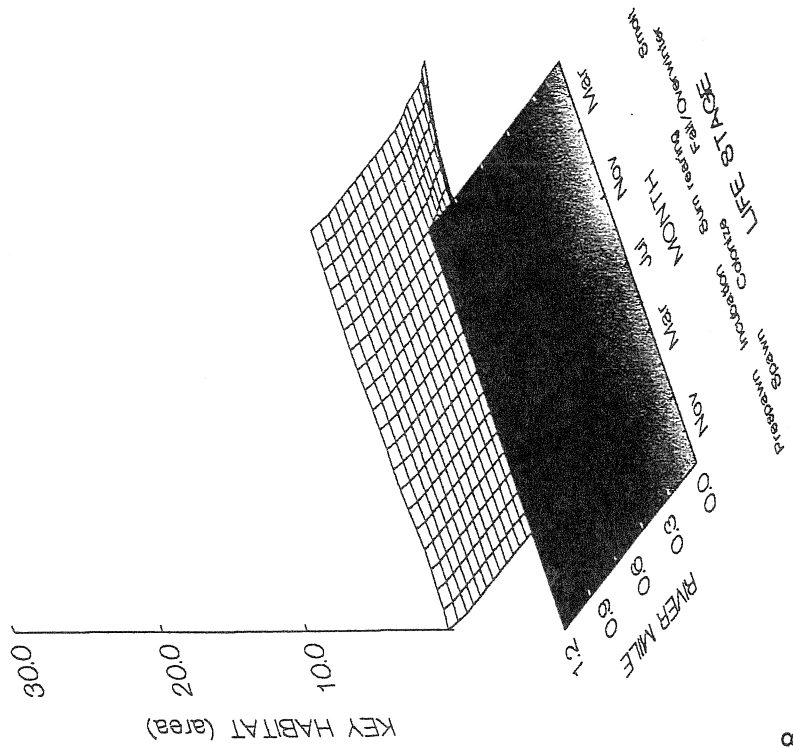
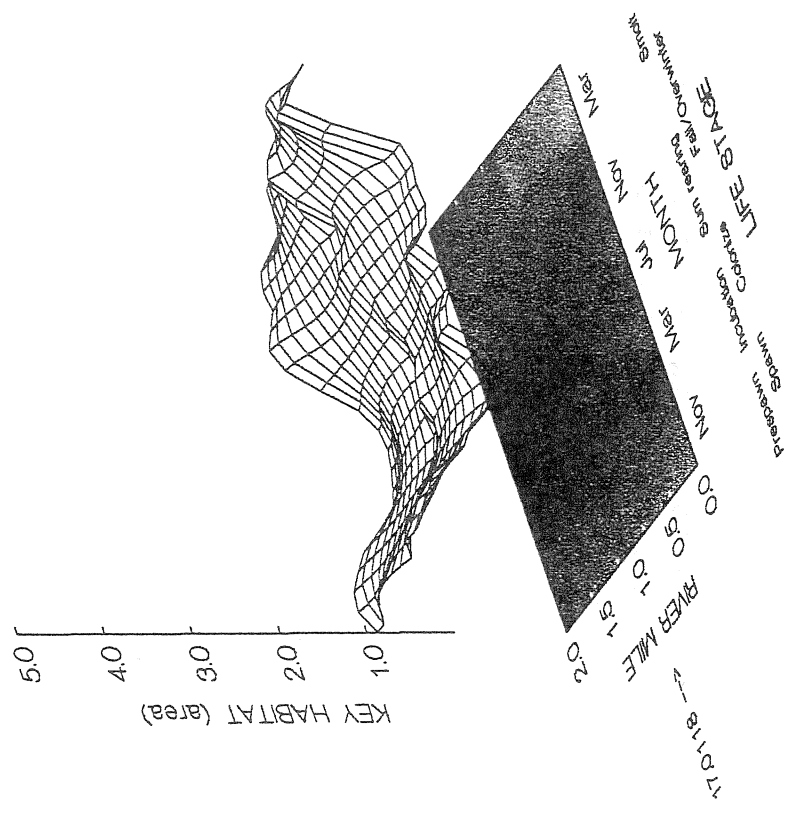


Figure A.6. Patient and template landscapes of key habitat quantity for Tributary 17.0118/Donovan Creek reach range. The z-axis is scaled to 5 m² of key habitat.

Patient



Template

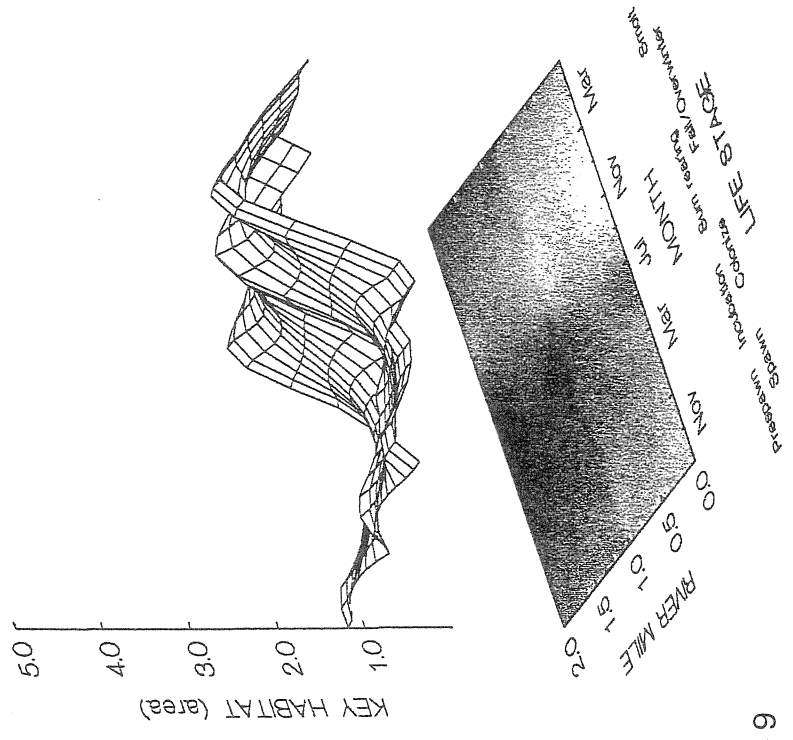
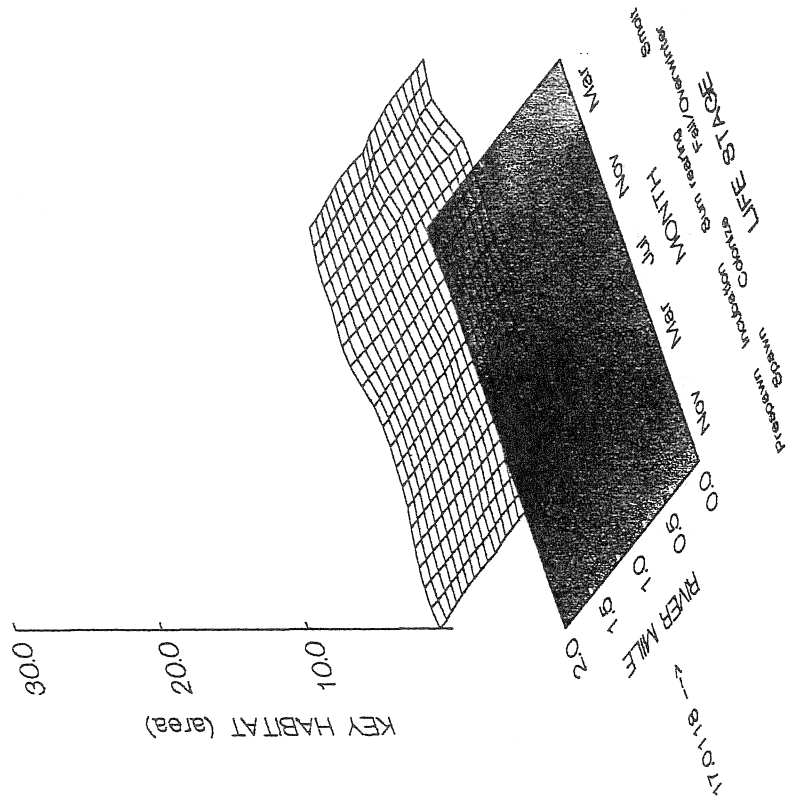


Figure A.7. Patient and template landscapes of key habitat quantity for Tributary 17.0116/Donovan Creek reach range. The z-axis is scaled to 30 m² of key habitat.

Patient



Template

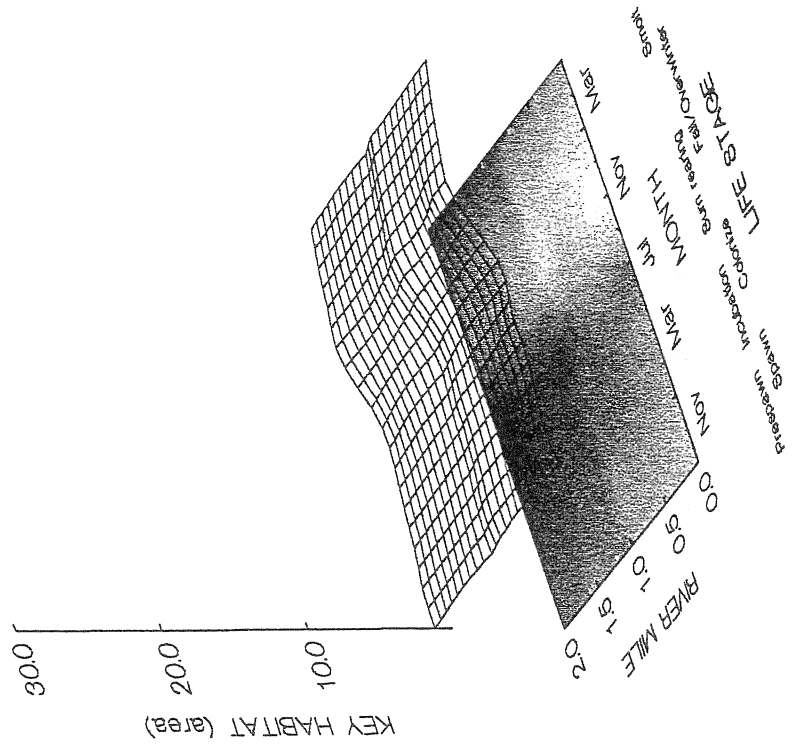
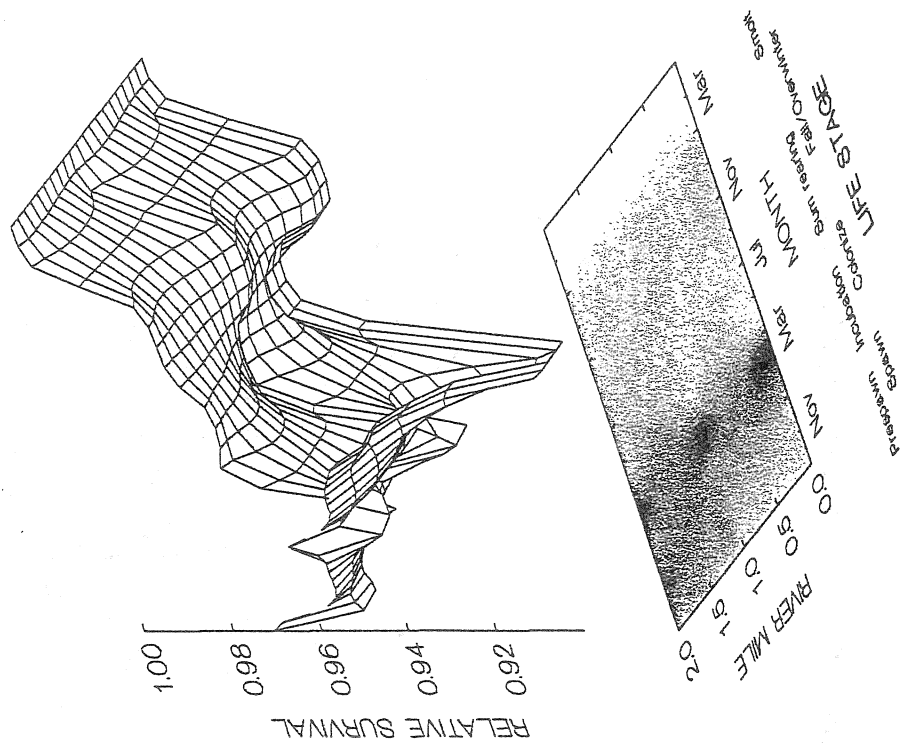


Figure A.8. Patient and template landscapes of relative productivity for Donovan Creek mainstem reach range.

Patient



Template

