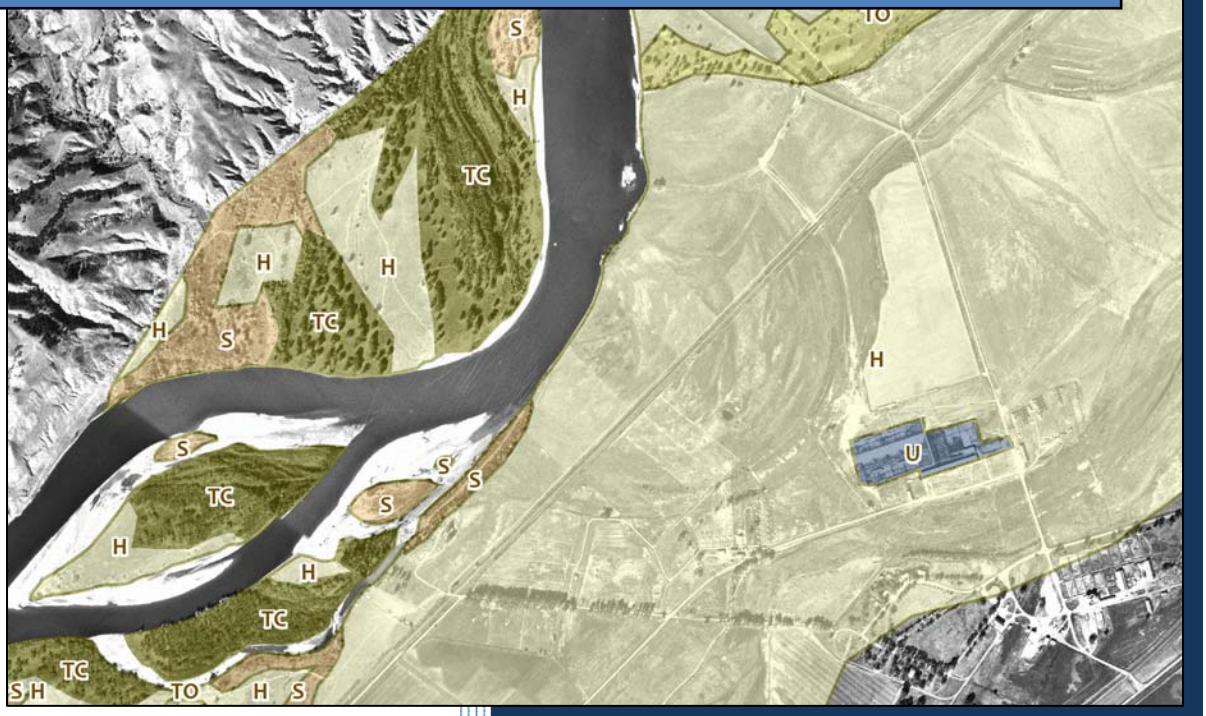
Final Report

July 28, 2008

Yellowstone River
Riparian Vegetation Mapping



Prepared for:

Custer County Conservation District

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Yellowstone River Conservation District Council

Tony Thatcher & Bryan Swindell
DTM Consulting, Inc.
211 N Grand Ave, Suite J
Bozeman, MT 59715
406-585-5322

Karin Boyd
Applied Geomorphology, Inc.
211 N Grand Ave, Suite C
Bozeman, MT 59715
406-587-6352

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1 Introduction

One of the objectives of the Yellowstone River Cumulative Effects study is to assess the historic changes in riparian vegetation within the Yellowstone River stream corridor through time. This report summarizes an air photo-based mapping assessment that was performed in support of that goal. The assessment described herein consists of remote mapping of riparian vegetation using multiple suites of aerial photography, and an initial analysis of the resulting data. This work was performed for the Custer County Conservation District and the Yellowstone River Conservation Districts Council.

The primary tasks associated with the riparian vegetation mapping effort include the following:

1. Mapping of major vegetation polygons within the Yellowstone River corridor from the Park/Sweetgrass County line (near Springdale) to the confluence with the Missouri River. This mapping is based on aerial photography from the 1950s, 1976-1977, and 2001.

2. Description of each mapped vegetation polygon in terms of major vegetation type, as well as location (region, reach, and bank).

3. Initial summarization of the mapping data, including evaluations of general trends through time, spatially through the corridor, and in terms of geomorphic reach type.

The results of the data analysis contained within this report include a large number of plots, as well as tabulated results in Appendix C, D and E. As a project team, we consider it important to present the data in numerous ways, because the interpretation of the results requires careful integration of the various metrics that describe riparian conditions within the Yellowstone River corridor. We therefore encourage users of this document to become familiar with the various metrics that are presented, and when evaluating the condition of a single reach, we recommend the consideration of all of those metrics rather than focusing on any single result.

1.1 Yellowstone River Reach Delineations

Based on a classification system developed for the project, the river has been divided into 67 reaches between Springdale and the Missouri River (AGI and DTM, 2004). These reaches average approximately 7 miles in length, and the classification applied to each reflects conditions such as stream pattern (number of side channels, sinuosity), and confinement (presence of bedrock). Appendix A contains a list of project reaches and their general locations. The classification scheme utilized in the reach assessment is summarized in Appendix B.

Over the channel extent represented by the 67 reaches, the physiography of the Yellowstone River and its tributaries transitions from steep, confined mountainous areas to plains conditions. As part of the geomorphic reconnaissance study (AGI and DTM, 2004), the corridor was subdivided into four regions, and reaches are identified with respect to their region (Figure 1-1).

- Region A: From Springdale to the Clarks Fork of the Yellowstone confluence near Laurel, the river contains a total of 18 reaches (A1 through A18). These reaches are typically anabranching (supporting long side channels separated by the main channel by wooded islands), as well as braided (supporting split flow channels around open gravel bars). The reaches are typically "partially confined", indicating that the bedrock valley

wall commonly affects one bank of the river. The low terrace commonly follows the channel edge, and a few exposures of high terrace form the modern channel margin.

- Region B: Between the Clarks Fork confluence and the Bighorn River confluence, the river contains 12 reaches (B1 through B12). Reach types are variable, ranging from straight to braided. Similar to Region A, bedrock valley wall controls are intermittent. Both low terrace and high terrace features locally form the channel bankline.
- Region C: Between the Bighorn River and the Powder River, Region C consists of a lower gradient system that supports a wide range of reach types. A total of 21 reaches (C1 to C21) have been identified in Region C, and these reaches range from unconfined, multi-thread channels in the Mission and Hammond Valleys, to highly confined areas downstream of Miles City.
- Region D: Below the Powder River confluence, Region D contains 16 reaches (D1 to D16). The uppermost segments of this region, from the Powder River to Fallon, are closely confined by bedrock valley walls. Downstream of Fallon, confinement is reduced, and broad islands are common.

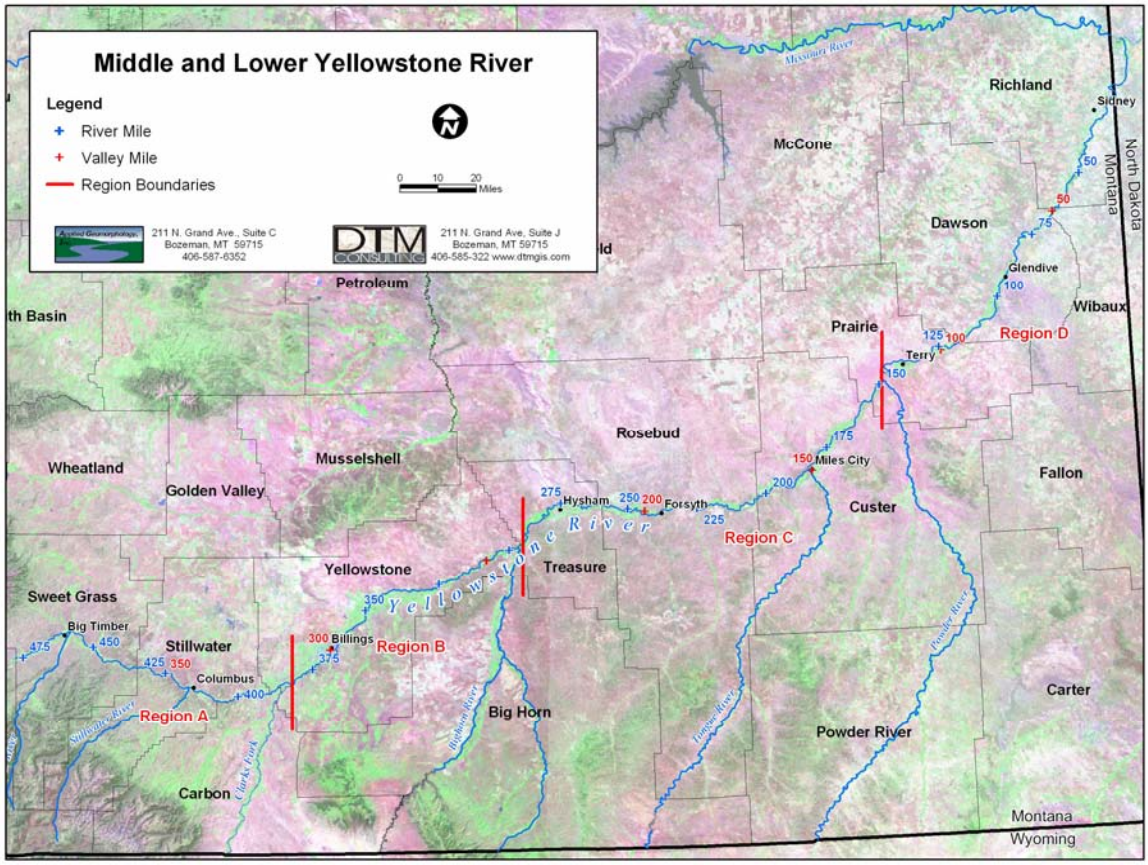

Figure 1-1. Regional geomorphic zones of the Middle and Lower Yellowstone River.

2 Methodology

This riparian vegetation mapping effort required developing specific methodologies to achieve the overall project objectives using existing rectified aerial imagery as base maps. These methodologies relate to the definition and application of appropriate vegetation map units, the determination of the lateral boundary of area to be mapped in the stream corridor, digitization techniques, determination of an appropriate mapping scale, and data analysis. This methodology resulted from the Riparian Vegetation Pilot Study and was further adapted through input from the project team. The following sections describe the approaches adopted for each of these project elements, and also describe specific challenges encountered.

2.1 Riparian Vegetation Mapping

The vegetation mapping effort consisted of digitizing vegetation polygons using 1950's, 1976-1977, and 2001 aerial imagery in a GIS environment. The polygons are digitized at a scale of approximately 1:7,500, with a minimum mapping unit of approximately 10 acres. The goal of the delineation was to capture areas of similar vegetation structure as they appeared on the aerial imagery, while maintaining a consistent scale. This was notably challenging with the 1950 images due to locally poor resolution of the riparian areas. The 1977 and 2001 imagery has significantly better resolution.

Figures Figure 2-1 and Figure 2-2 show the same section of reach B11 in Yellowstone County at the mapping scale of 1:7,500.

Six vegetation classes were developed for the mapping effort (Table 2-1 and Figure 2-2). These classes were determined to be the highest level of detail permitted by all suites of imagery. For the purposes of this study, only the three woody vegetation classes are summarized as "riparian". The Herbaceous, Channel and Outside of Floodplain classes were not summarized or analyzed by this study.

Table 2-1. Vegetation classes used in the riparian mapping effort.

Vegetation Class	*Code*	*Summarized as a Riparian Class?*
Herbaceous	H	No
Shrub	S	Yes
Open Timber	TO	Yes
Closed Timber	TC	Yes
Channel	Ch	No
Outside of Floodplain	OUT	No

It should be noted that, due to the remote nature of the mapping, the vegetation delineation is subject to interpretation errors. While polygon boundaries may be of good accuracy, the vegetation class assigned to them is in many places limited by the resolution of the photography. Efforts were made to verify the spatial and attribute accuracy of vegetation polygons, including checking them against field data collected by the avian study that was recently completed by MSU as part of the overall Yellowstone River Cumulative Effects Study.

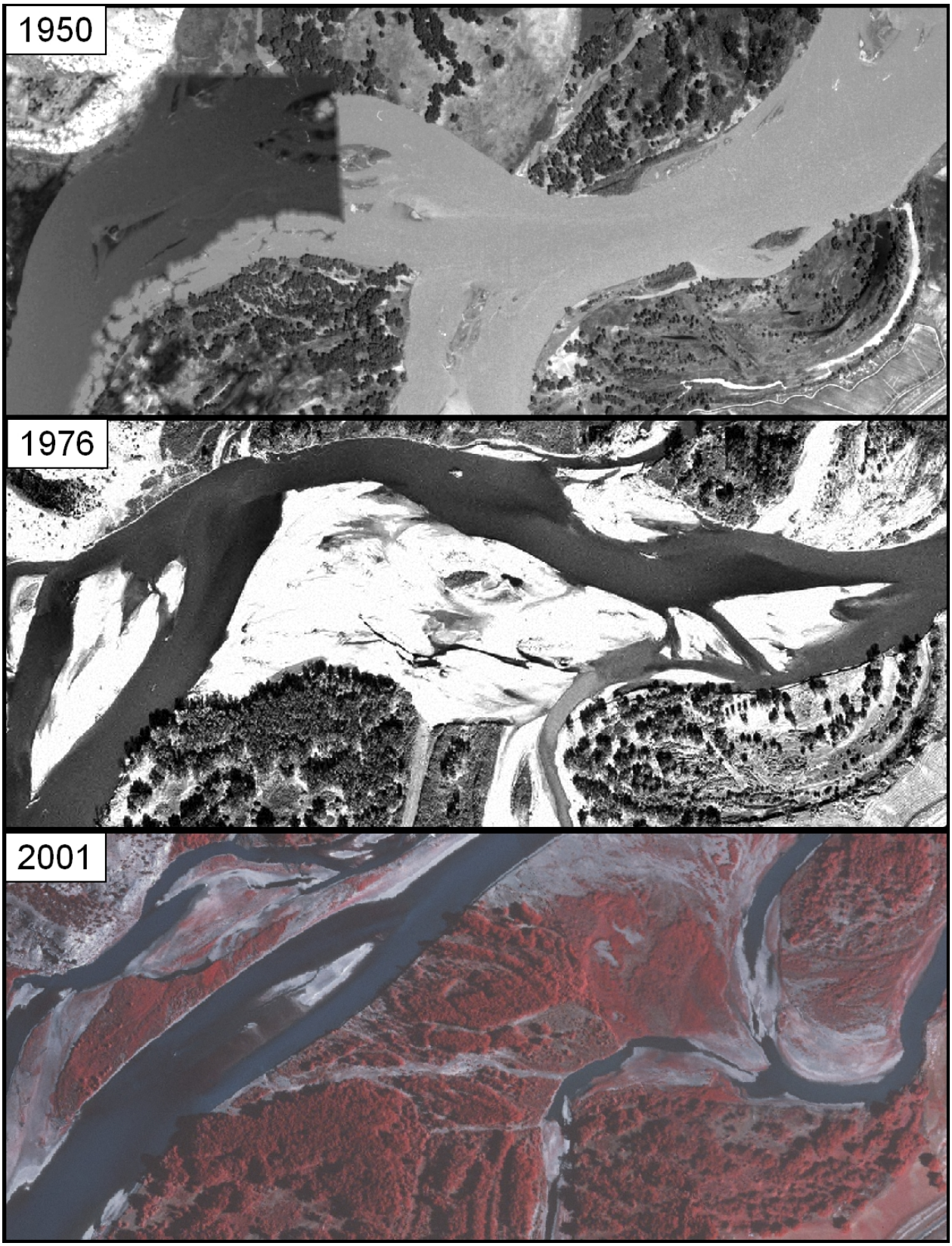

Figure 2-1. 1950, 1976 and 2001 aerial photography used for the riparian vegetation mapping at a scale of 1:7,500, reach B11 in Yellowstone County.

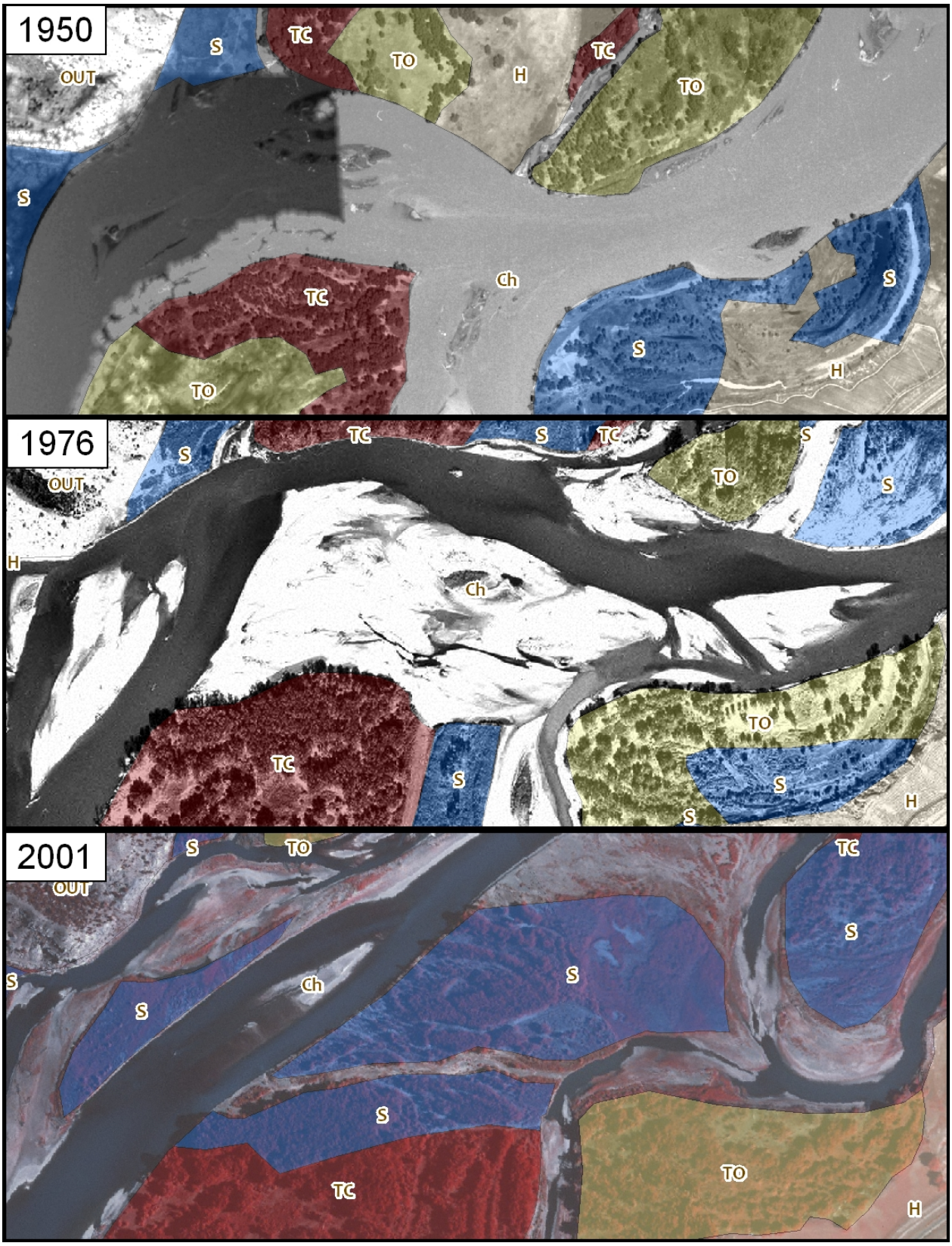

Figure 2-2. 1950, 1976, and 2001 aerial photography with riparian vegetation polygons and labels. Polygon colors correspond to the colors in the bar charts.

2.2 Mapping Corridor Extent

The GIS database (ESRI Personal GeoDatabase) that has been developed in support of the Yellowstone River Cumulative Effects Study includes digitized lines that identify bankfull channel margins on each suite of photography. These mapped "banklines" reflect the boundary between unvegetated channel environments and floodplain areas that are colonized with woody riparian vegetation. To keep the riparian vegetation data topologically consistent with the various Cumulative Effects Analysis datasets, all vegetation polygons were edge-matched to and made coincident with the existing banklines.

The outer margin of the mapping area is also consistent between suites of imagery. Previous efforts to define the corridor area in the Cumulative Effects Study included the approximation of the 100-year floodplain boundary as defined by GIS-based inundation modeling. This boundary was utilized to identify minimum extents of topographic data collection, and is used herein (with a 1/10 mile landward buffer added) to define lateral limits of riparian vegetation mapping. This adoption of a consistent mapping boundary allows direct comparison of the polygon areas in terms of percent cover within a given reach. In some areas, the imagery does not extend to the mapping boundary; these areas are classified as "OUT".

2.3 Digitizing Guidelines

The following list provides the general guidelines used during the digitizing process.

1. The approximate digitizing scale was 1:7,500, and the minimum mapping unit was approximately 10 acres. Under the following conditions, an exception was made for smaller polygons:
    a. Some vegetated islands were smaller than 10 acres.
    b. Occasionally, a shrub patch, pasture or timber stand would be differentiated from the surrounding polygon if it was felt that the additional delineation was more representative of the vegetation pattern present.
    c. Vegetation patches along the river bank were generally digitized regardless of size (excepting single trees and shrubs).
    d. If a vegetation patch was digitized in one time period it would likewise be digitized in the other time periods, even if in the other time periods the patch was less than 10 acres.

2. Corridors of multiple parallel roadways and/or railroads were delineated as Urban. Since the interstate did not exist in the 1950s, very few urban transportation corridors exist for that time period.

3. For all three years, the respective banklines were used as the starting point for the riparian vegetation polygons. The outermost boundary of the digitized area, for all years, is the 100-year inundation model boundary plus $1/10^{th}$ of a mile. Bedrock bluffs and some high terraces are within the $1/10^{th}$-mile buffer but are obviously out of the floodplain. Such

areas were classified as OUT. Areas within the digitizing area where photography did not exist were also classified as OUT.

4. Only farmsteads of significant size were delineated as Urban. Smaller, isolated farmsteads are included in the category that surrounds them. The exceptional farmsteads are those located along the fringe of cities and towns. In such cases, they were lumped into the Urban category regardless of their size.

5. Small pockets of trees lying within Urban polygons were not differentiated, unless they were located near the river and were obviously subject to riparian processes.

6. Small bodies of water (ponds, stream pools, etc.) were incorporated into their surrounding vegetation polygon. Larger ponds are labeled as Urban if they are obviously man-made.

2.4 Specific Mapping Challenges

A few specific challenges encountered in the mapping effort are worth noting and described below. Earlier pilot study work identified these likely scenarios, and thus they were expected to create mapping challenges. The situations described below were handled on a case-by-case basis, and typically included input from several members of the project team.

1. It is inherently difficult to differentiate between grass and other non-woody vegetation on the imagery. As such, crops, pasture and meadow lands were collectively considered 'Herbaceous' in the mapping effort. Also, after an initial attempt, it was determined that wet and dry 'Herbaceous' areas could not be consistently differentiated on all sets of imagery. Because of this, wetland areas are not specifically attributed as such.

2. The adoption of only a few vegetation classes in a system that supports such a complex mosaic of riparian vegetation requires the determination of the dominant vegetation type in any given area. For example, wide-open meadows punctuated by one or two trees were designated as Herbaceous, not Open Timber. Similarly, large expanses of Shrub were named as such, even if there was the occasional cottonwood tree growing within it. Deciding which vegetation types were dominant was generally up to the discretion of the digitizer, with additional adjustments made as necessary during the QA/QC process.

3. In some areas, variations in the quality and color of imagery made it difficult to establish firm visual criteria for vegetation types. This is especially true for certain portions of the 1950s image set. To reduce inconsistency, all areas of the river were reviewed multiple times. However, in some cases, the image quality is so poor that the vegetation cannot be recognized. In these areas the other two image sets were used to help make the vegetation class determination.

4. The most difficult vegetation class to delineate was the 'Shrub' class. The challenges in identifying this vegetation type on air photos have likely resulted in an underestimation of its extent. These challenges include the following:
    a. Shrubs often occur in patches less than the minimum mapping unit of 10 acres.
    b. Shrubs often occur in low densities within areas dominated by herbaceous vegetation. There are many meadows punctuated by occasional shrubs, but because grasses make up the majority these polygons were given an 'Herbaceous' attribute.
    c. Shrubs often occur in long, thin patches, especially along ditches and roads. For this reason they often could not be digitized at the desired mapping scale of 1:7,500.
    d. Shrubs are easily confused with small trees (saplings) and in many cases it was impossible to distinguish between the two.
    e. Small areas of shrubs growing in areas dominated by timber are not differentiated from the dominant Open Timber or Closed Timber class.
    f. Recognizing shrubs on the 1950s image set was especially difficult.

2.5 Data Analysis

The data tables, graphs, and figures included in this report represent a preliminary assessment of the mapping results. The results are intended to highlight approaches to displaying the data, and to identify areas with clear trends in riparian vegetation extent through time. The results have not been scrutinized with respect to conditions at the time of photography, digitizing biases, or limitations associated with the georeferencing of aerial images.

Several of the riparian polygon measures that have been calculated are presented in this report as box and whisker plots. These plots are used to summarize numerous data points within a specific dataset, which, for example, may reflect all reaches of a specific geomorphic reach type. These plots display calculated maximum, minimum, median, and quartile values for a given dataset. This approach allows a graphical presentation of the data, which allow an easy comparison of data range (whiskers) and data clustering around the median (box) for a suite of data (Figure 2-3). Although the plots provide a good graphical representation of the data it is important to note that these data have not undergone analysis for statistical significance; in many cases, the n-values (number of data points in a given dataset) are notably low.

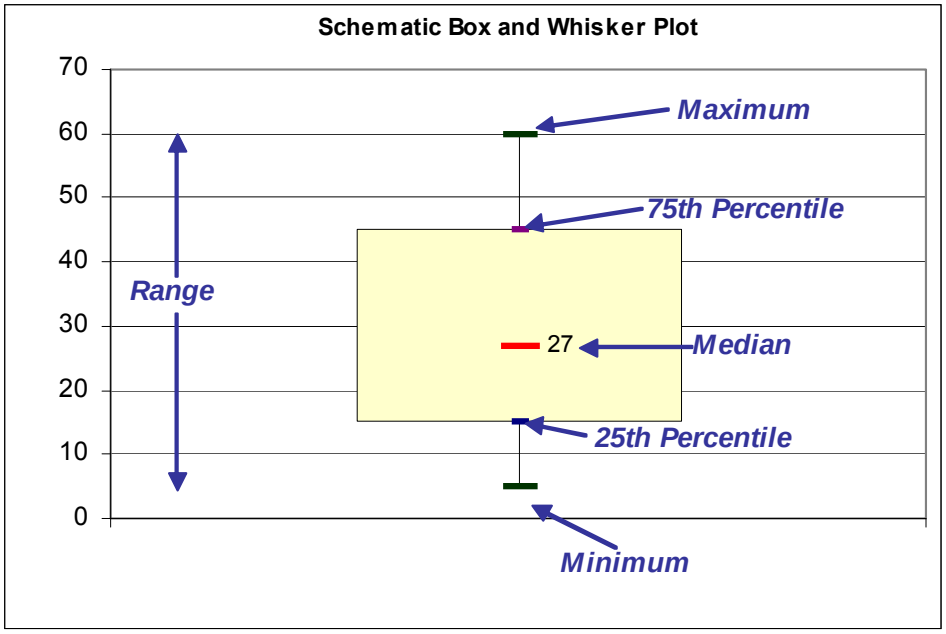

Figure 2-3. Schematic diagram of a box and whisker plot.

3 Results

The results of the riparian vegetation mapping effort include GIS Feature Classes files that delineate vegetation classes for the entire Yellowstone River corridor downstream of Springdale, Montana. These vegetation maps reflect conditions in the 1950s, 1976-1977, and 2001. These GIS layers are available to support further work related to the Cumulative Effects Study sponsored by the Yellowstone River Conservation District Council.

In order to develop a general sense of riparian change through time, basic statistics have been developed for the mapping data. These statistics summarize the overall extents of given vegetation classes through time, an estimate of general polygon shape complexity (perimeter-area ratio) and connectivity between vegetation types (nearest neighbor distances). Statistics have been generated for each individual reach, and summarized by reach type and region. The mapping results are also differentiated in terms of river bank to see if changes in vegetation type extents balance across the river. The right and left bank attributes refer to the side of the river that the map unit is located on in relation to the primary channel, as viewed downstream. Thus, the "left bank" of the Yellowstone River is generally on the north side of the channel. The results of the data analysis are tabulated in Appendices C, D and E.

3.1 Riparian Vegetation Extent

For each reach, the total extent of a given vegetation type was calculated as percent cover. This reflects the total aerial extent of a given vegetation class for each suite of photography. Since the total mapping area for each reach was consistent for each set of air photos, a comparison in the percent cover for a given type reflects true gains or losses in acreage of that vegetation class. The results of the percent cover calculation through time are shown by Region in Figure 3-1 through Figure 3-4. The plots also show river bank to help identify any notable shifts in percent cover from one bank to another. The x-axis of the plots show the reach name, as well as the geomorphic classification assigned to each reach. In Figure 3-1, for example, reaches are individually referred to as A1 through A18. Reach type labels located above that reference are abbreviations for specific classifications. For example, Reach A4 is a "UB" type, which is an Unconfined Braided channel type. Definitions for the classifications are contained within Appendix B.

In Region A, which extends from Springdale (Reach A1) downstream to the Clarks Fork confluence (Reach A18), the riparian cover types of shrub, open timber and closed timber collectively provide between around 10% and 50% of cover (Figure 3-1). Between Columbus and Laurel, Reaches A15 through A18 consistently have relatively high cover (>35%) on the right bank. In this area, the river closely follows a steep bedrock valley wall to the south; as such, the right floodplain area appears to have poor access and minimal agricultural clearing. Woody riparian vegetation extent is notably low in Reaches A5 and A6, which is between Big Timber and Greycliff.

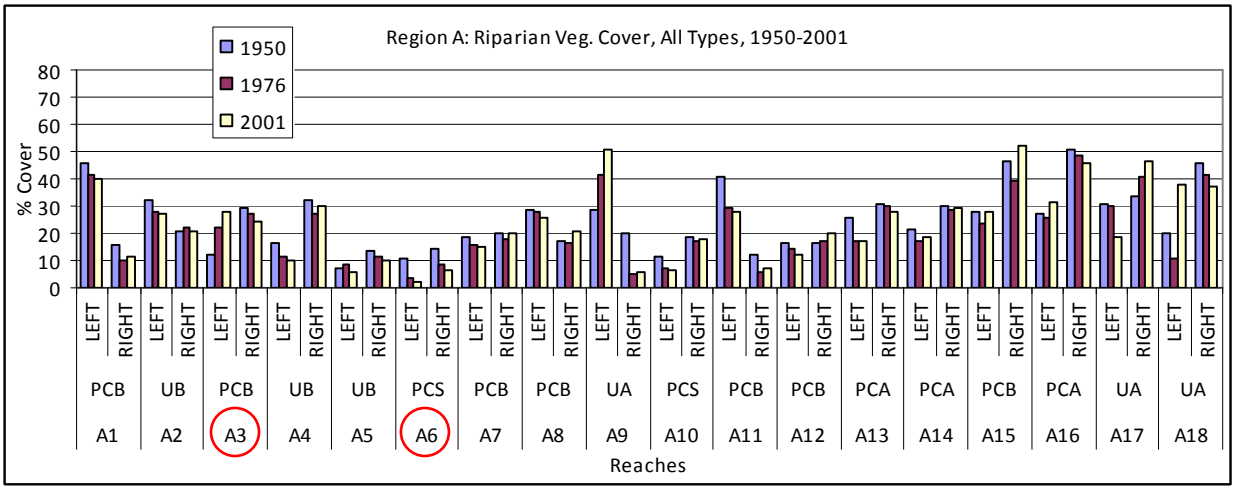

Figure 3-1. Total riparian vegetation percent cover (S, TO and TC) within Region A, 1950-2001.

A plot of total percent cover through time on each bank shows some interesting results with respect to channel migration and riparian succession. For example, Reach A3, which is just upstream of Big Timber, depicts an increasing total cover of riparian vegetation on the left bank, while simultaneously losing vegetation on the right bank. Within this reach, lateral migration of a major bendway has led to a marked transfer of woody vegetation acres from one bank to the other. This reflects active succession of the riparian corridor through channel movement, bank erosion, and point bar growth. As vegetation is lost on a cutbank (right bank in A3), the growth of a point bar on the opposite bank (left bank in A3) allows for woody riparian species colonization of that surface.

Also of note in Region A is reach A6, which shows a decrease in riparian vegetation on both banks during the study period. Within this reach, the left bank experienced a relatively large conversion from Shrub to Herbaceous cover, while the right bank lost Open Timber and Shrub acres to Herbaceous. This reach, located upstream of Greycliff, has experienced both agricultural development and residential development since 1950. Net losses in woody vegetation cover are also evident in Reaches A1, A2, A4, A5, A10, A11 and A13.

Region B extends from the Clarks Fork confluence to the mouth of the Bighorn River. All of Yellowstone County is within Region B. Of the 12 total reaches in the region, two show shifts in riparian vegetation cover extents from one bank to another (Figure 3-2). Reach B5 is located in a area supporting a wide riparian forest just downstream of Huntley. The total riparian cover in this reach is notably high, exceeding 35% on both banks in 2001. The reach is dynamic, and some of the shift may be due to channel avulsion ("jumping" to a new primary thread), as well as migration. Reach B11, which also shows a transfer of riparian cover from the left to the right bank is similarly dynamic reach with a wide woody riparian vegetation corridor; Reach B11 is located just upstream of Custer. Other trends evident in Figure 3-2 include consistent gains in riparian vegetation cover on the left banks of Reaches B6 and B12, with no corresponding shifts on the opposite bank.

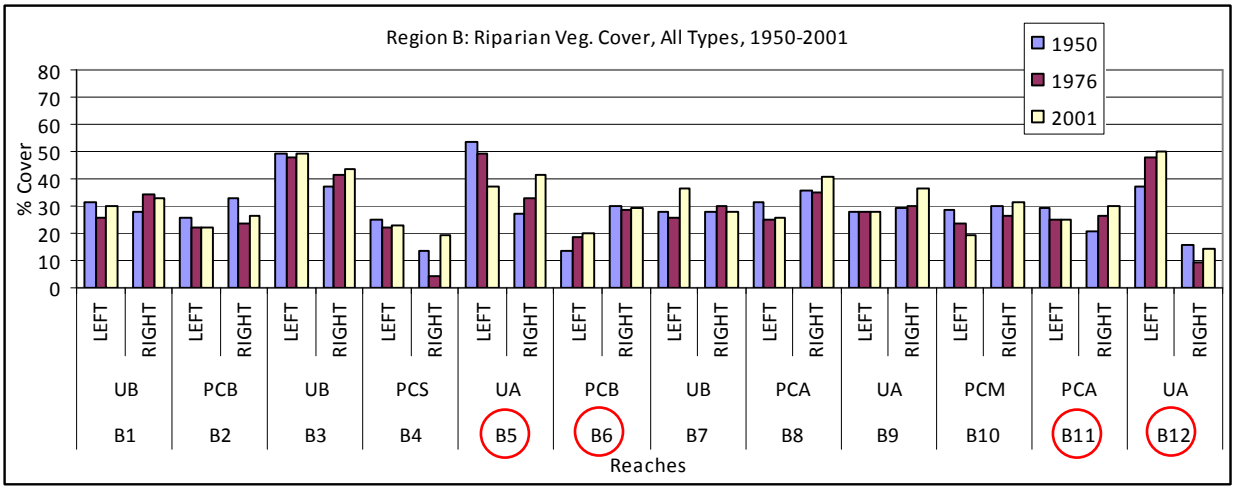

Figure 3-2. Total riparian vegetation percent cover (S, TO and TC) within Region B, 1950-2001.

Region C extends from the mouth of the Bighorn River to the mouth of the Powder River near in Prairie County (Figure 3-3). The total extent of riparian cover downstream of Reach 16 is notably low, and this reflects the very limited extent of woody riparian vegetation between Miles City (Reach C17) and the Powder River (Reach C21). This narrow riparian corridor correlates to significant geologic controls of the Fort Union Formation (Tullock Member), which has limited channel migration and woody vegetation establishment.

Reach C3, located upstream of Hysham, has a notably high extent of woody riparian vegetation cover. This is an Unconfined Anabranching (UA) reach type, indicating extensive side channels and vegetated islands. Reach C14, just downstream of Hathaway, shows a loss of riparian vegetation coverage on both banks between 1950 and 2001. Some agricultural clearing is evident within the reach, which straddles the Rosebud County/Custer County line.

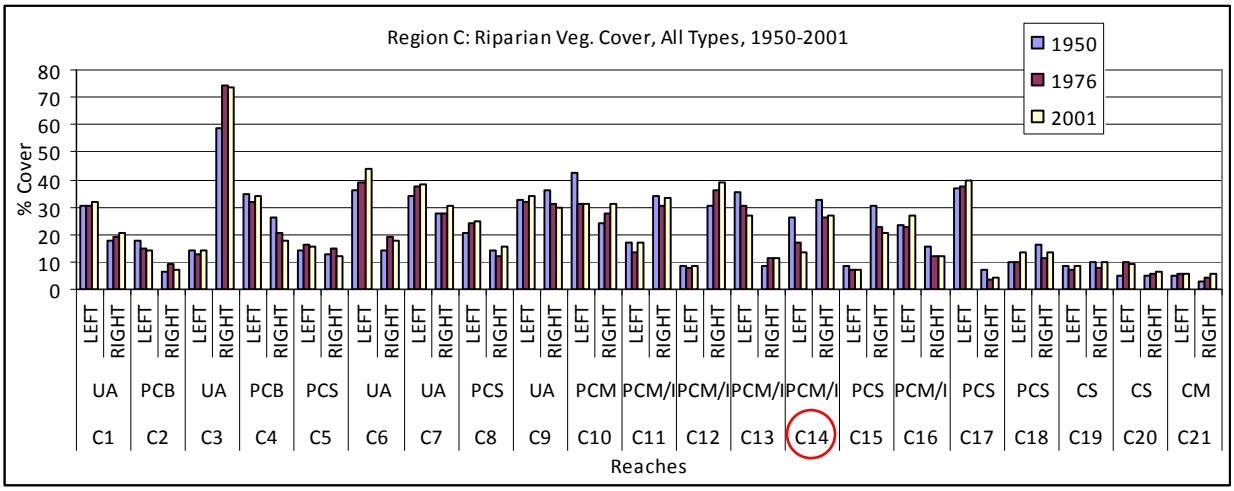

Figure 3-3. Total riparian vegetation percent cover (S, TO and TC) within Region C, 1950-2001.

From just upstream of Glendive (Reach D5) to about 13 miles upstream of the Montana state border (D12), the extent of woody riparian vegetation cover commonly exceeds 40% (Figure

3-4). This area includes the broad riparian forests of Elk Island and Seven Sisters Island. Reach D5, upstream of Glendive, shows a transfer of riparian cover from the right bank to the left bank through time. The 1976 imagery does not extend into North Dakota (Reaches D15 and D16), hence the only datasets to compare for those two reaches are 1950s and 2001.

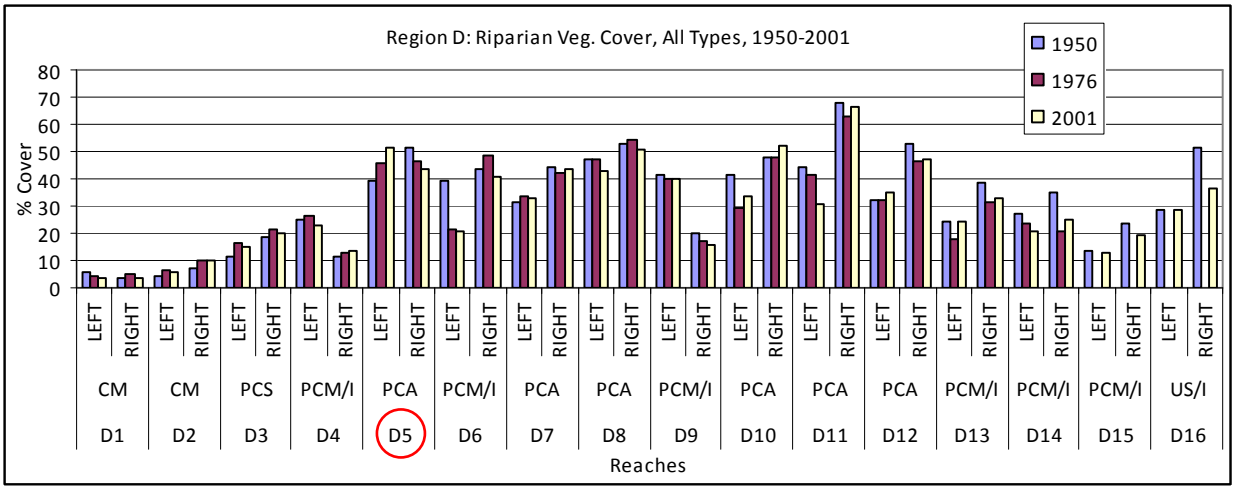

Figure 3-4. Total riparian vegetation percent cover (S, TO and TC) within Region D, 1950-2001.

3.1.1 Percent Change in Riparian Cover Through Time

For each reach, the change in total riparian cover was calculated for the 1950-2001 time frame. In the calculation, real acres were normalized as percent composition. The objective of this analysis is to quantify the extent of shift in riparian vegetation extent through time for a given reach or region, and to highlight specific reaches or reach types that have experienced notable change.

In Region A, the percent change in areal extent of total riparian vegetation rarely exceeds 100% of gain or loss for any given vegetation type between 1950 and 2001 (Figure 3-5). The most dramatic changes in the areal extent of riparian vegetation occurred in reaches A10 and A14, which show a six-fold increase from 1950 to 2001. In reach A14 just downstream of Columbus, the dramatic relative increase in Shrub cover shows no corresponding loss of Closed or Open Timber, which suggests that shrubs colonized herbaceous areas or open channel area between 1950 and 2001. In Reach A10 at Reed Point, the increase was in the Open Timber vegetation class. Further review of the photography suggests that these increases are a result of natural vegetation succession from Herbaceous to Shrub and Shrub to Open Timber. The most stable vegetation type in Region A is Closed Timber, with a maximum change of only 50% over the 50-year time frame.

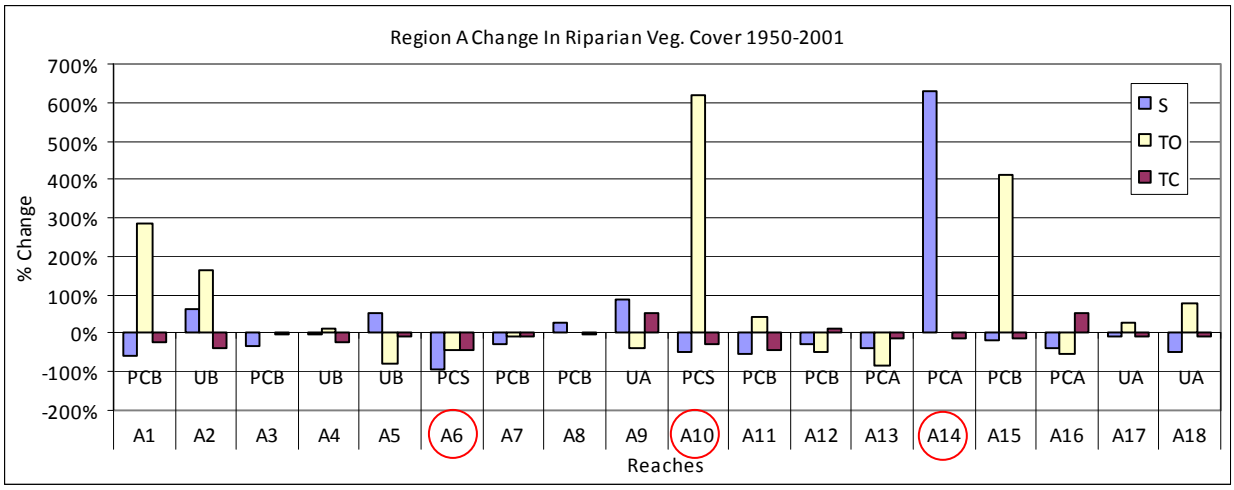

Figure 3-5. Percent change of normalized riparian vegetation cover from 1950 to 2001 within Region A.

Similar to Region A, the changes measured in Region B (Figure 3-6) are lowest for the Closed Timber vegetation type.

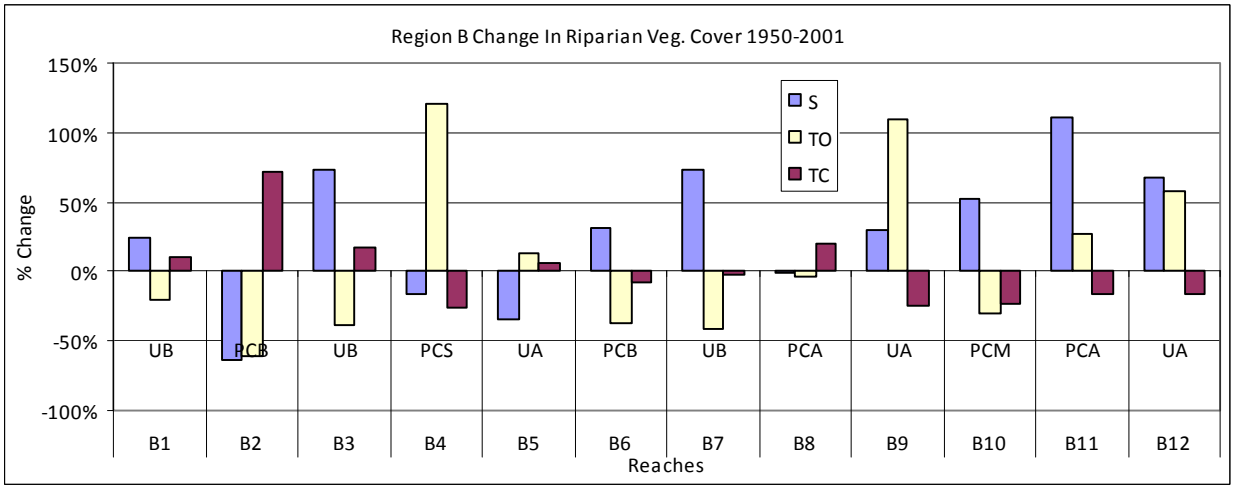

Figure 3-6. Percent change of normalized riparian vegetation cover from 1950 to 2001 within Region B.

The extent of Open Timber in Region C increased in most reaches between 1950 and 2001 (Figure 3-7). Downstream of Forsyth (C10), the extent of Closed Timber typically dropped over those 50 years. The marked increase in Open Timber in reach C3 reflects forested floodplain area just downstream of Myers; this area has been extensively diked and armored (below Myers bridge), and the increased area of Open Timber may reflect a reduced rate of channel migration and open bar shrub colonization since 1950.

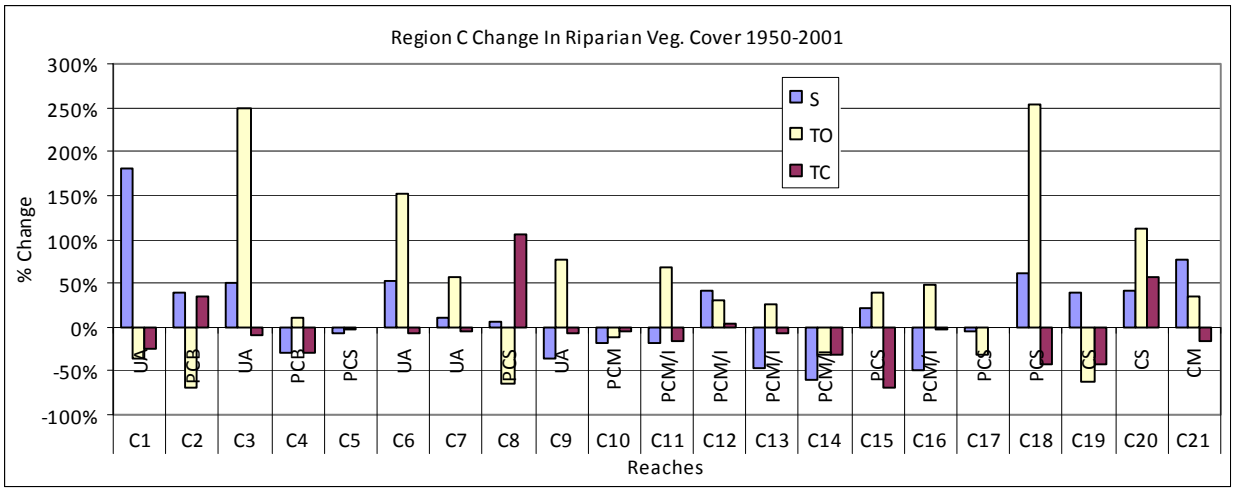

Figure 3-7. Percent change of normalized riparian vegetation cover from 1950 to 2001 within Region C.

Region D (Figure 3-8) depicts a series of reaches in which Shrub and Open Timber acres are consistently lost, while Closed Timber are consistently gained. This conversion suggests that the riparian forest in the area is maturing into a closed canopy, without commensurate colonization of areas by shrubs and young forest.

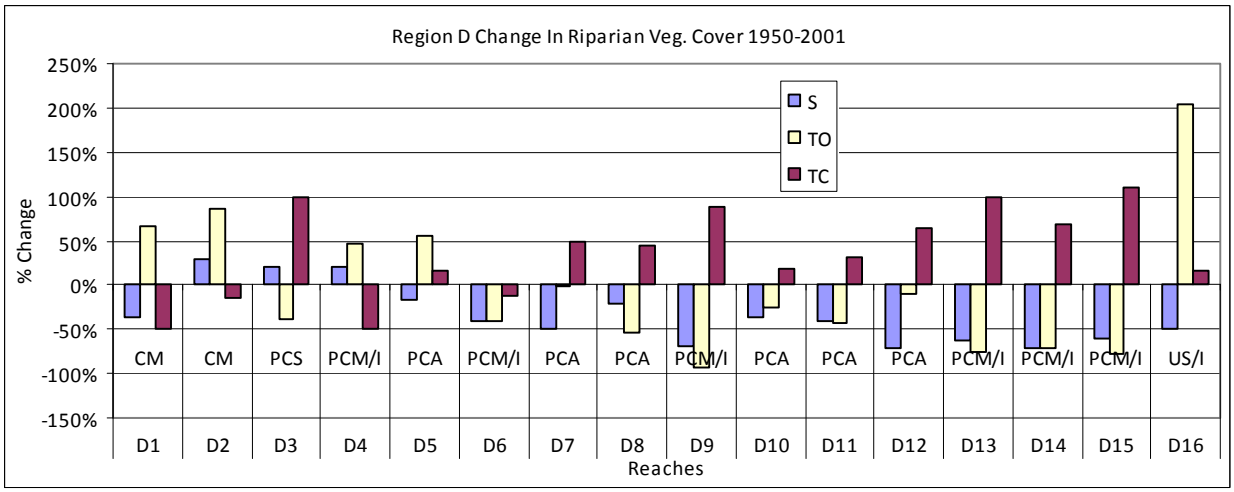

Figure 3-8. Percent change of normalized riparian vegetation cover from 1950 to 2001 within Region D.

To display the whole dataset in terms of change through time of a given vegetation type, the data were aggregated by region and displayed as statistical box and whisker plots. Figure 3-9 through Figure 3-11 show the minimum and maximum ("whiskers"), the median (horizontal line in box), as well as the first and third quartiles ("box"), of the percent change in shrub cover for all of the reaches within each region, from 1950 to 2001. With respect to shrubs (Figure 3-9), 75% of the reaches in Region B showed gains in shrub acreage, and half of those reaches show gains in excess of 31%. In Region D, however, over 75% of the reaches showed a loss in shrub coverage, with half of the reaches losing over 41% of their shrub coverage.

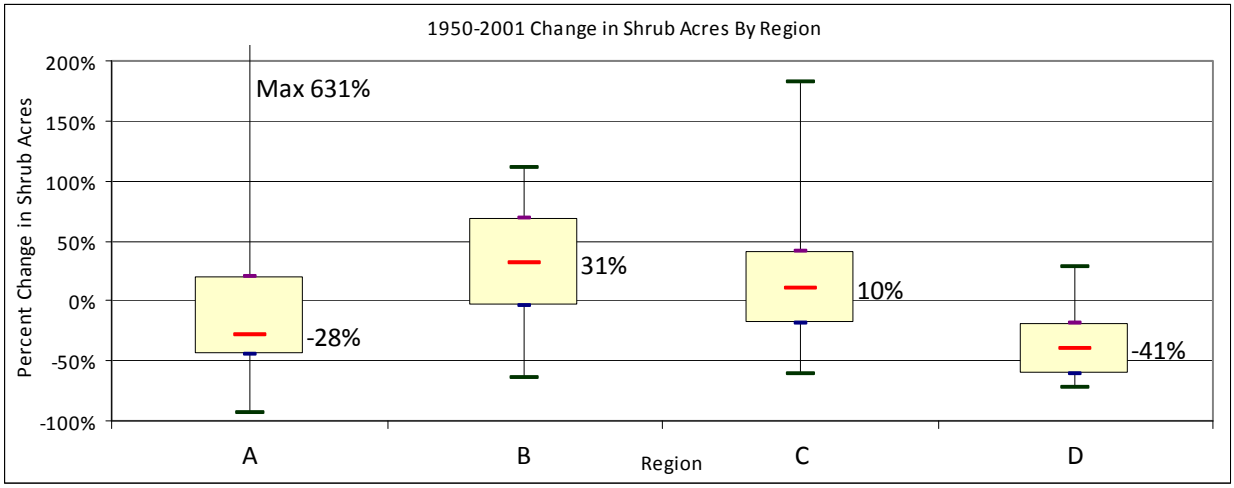

Figure 3-9. Statistical summary of reach-based change in shrub acres from 1950-2001.

The acreage of closed timber typically dropped through time in Regions A through C, but markedly increased in Region D (Figure 3-10). In Region D, over 75% of the reaches show a positive change in Closed Timber coverage from 1950 to 2001. Half of the reaches gained in excess of 39% coverage.

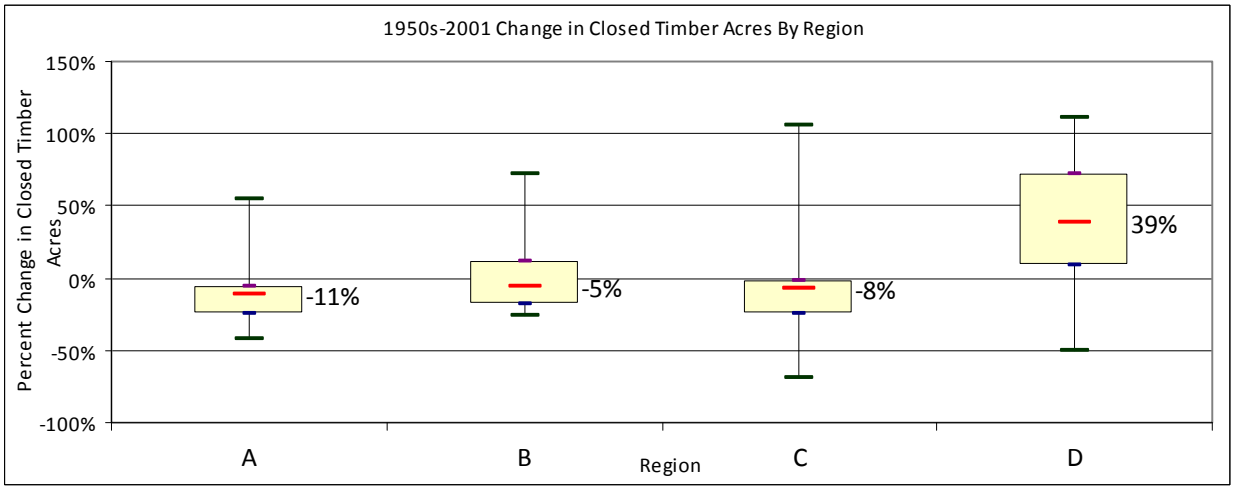

Figure 3-10. Statistical summary of reach-based change in Closed Timber acres from 1950-2001.

The Open Timber vegetation type (Figure 3-11) shows fairly balanced losses and gains for each region through time. For all reaches, the 25th and 75th percentile values are reflect losses (negative values) and gains (positive values), respectively. With regards to median values, however, the changes are more significant. In Region D, however, one half of the reaches lost at least 31% of their open timber cover; in Region C, one half of the reaches showed similar magnitudes of gain (30%).

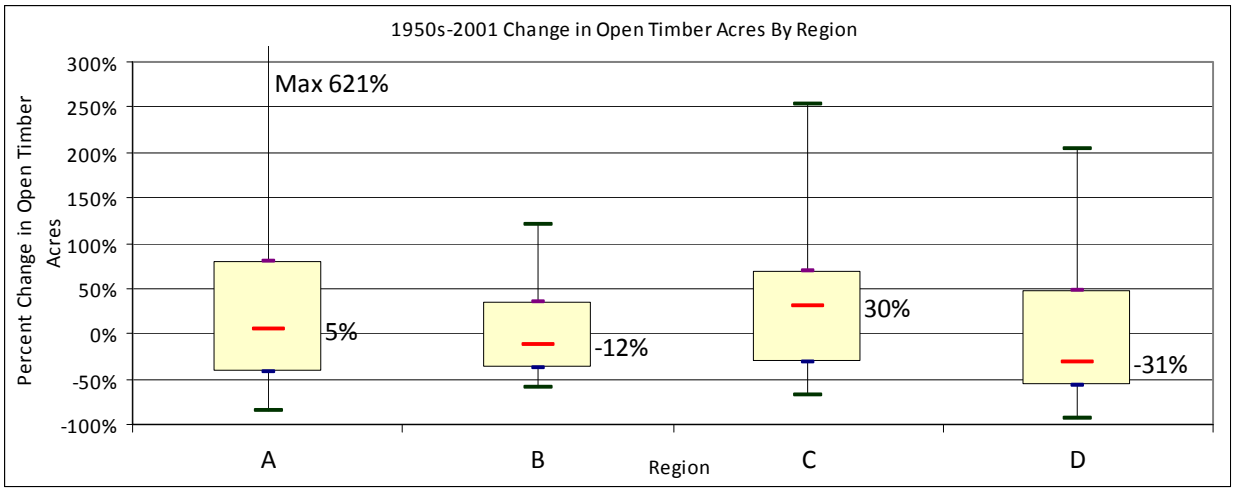

Figure 3-11. Statistical summary of reach-based change in Open Timber acres from 1950-2001.

3.1.2 Vegetation Extent by Reach Type

The geomorphic classification applied to each reach reflects conditions such as stream pattern (number of side channels, sinuosity), and confinement (presence of bedrock). As a result, the reach types are directly related to channel behavior and rates of change. As riparian vegetation colonization patterns are inextricably linked to channel process, it is important to consider riparian ecology with respect to stream geomorphology. In all areas for example, the anabranching reach types (PCA and UA) have a relatively large extent of riparian vegetation cover (Figure 3-12 through Figure 3-15). This reach type reflects split flow with well-vegetated intervening islands. In contrast, channel types that are straight/and or confined by valley walls tend to support relatively low extents of riparian vegetation.

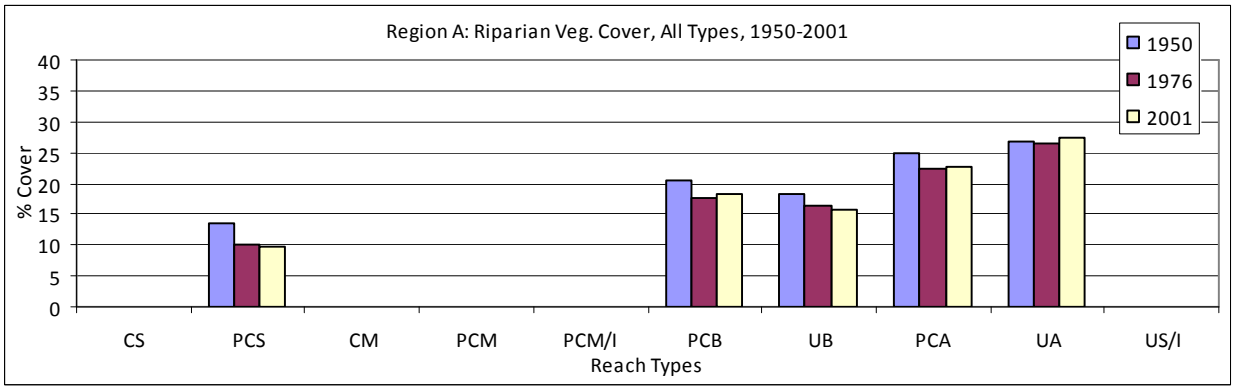

Figure 3-12. Riparian cover extent as a function of channel type, Region A.

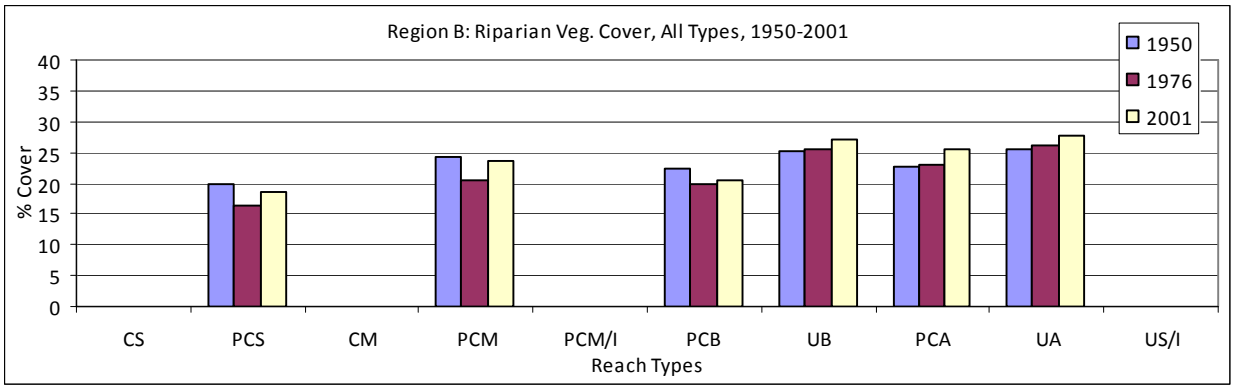

Figure 3-13. Riparian cover extent as a function of channel type, Region B.

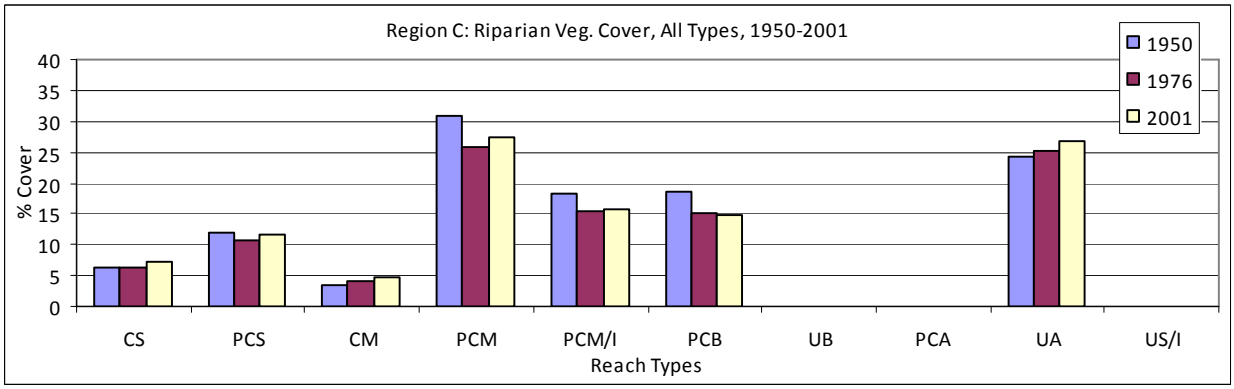

Figure 3-14. Riparian cover extent as a function of channel type, Region C.

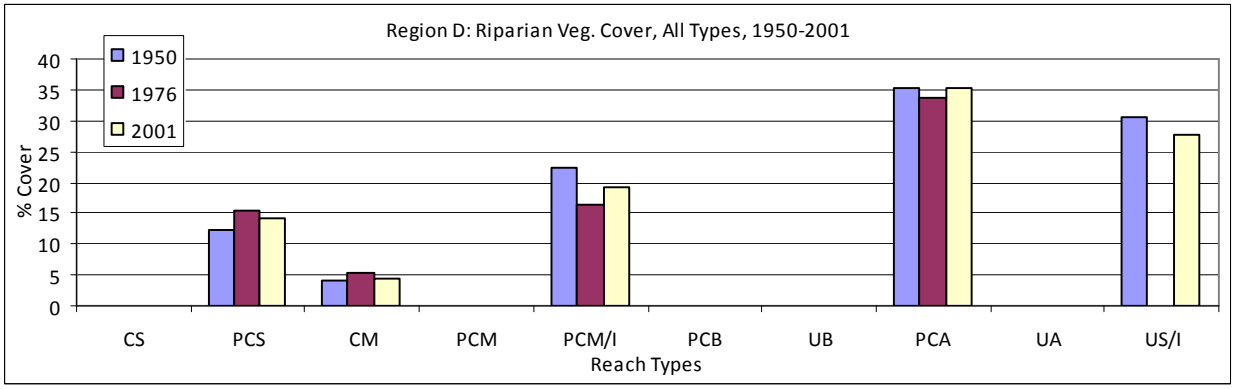

Figure 3-15. Riparian cover extent as a function of channel type, Region D.

3.2 Vegetation Polygon Count

The number of polygons mapped in the stream corridor broadly reflects the spatial complexity of each vegetation type in a given reach. Where polygon counts are relatively high, the landscape is likely more fragmented than areas where only a few mapping polygons exist. This fragmentation may be the result of human impacts, but it may also reflect the presence of side channels and islands.

The total count of polygons mapped in each region for each vegetation type are shown in Figure 3-16 through Figure 3-19. In region A, the number of Closed Timber polygons are approximately triple the number of Open Timber polygons. No distinct temporal changes are apparent with regard to polygon count, with the exception of 1976 being a period of relatively high number of Shrub and Closed Timber polygons.

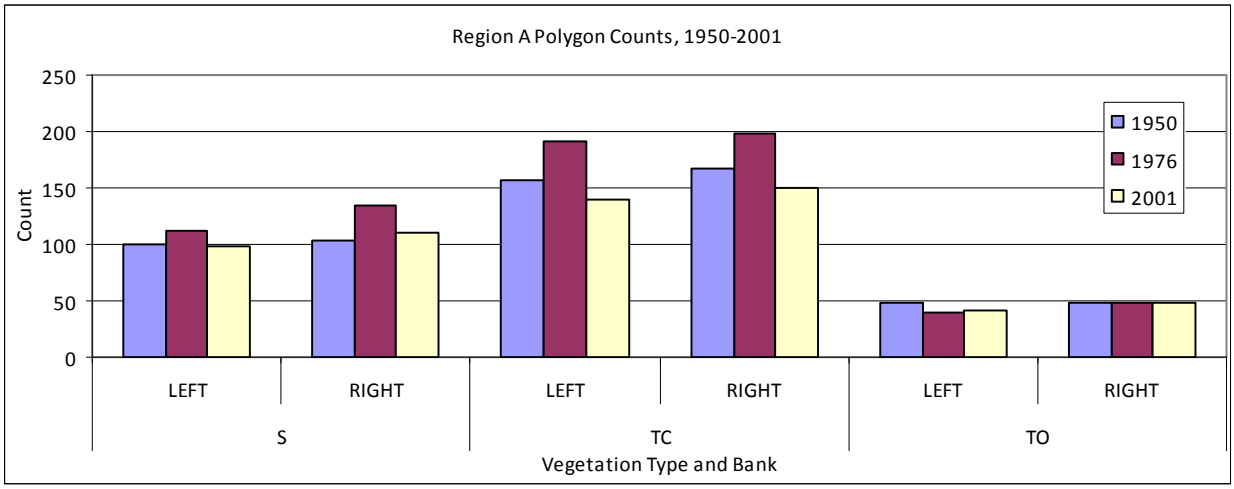

Figure 3-16. Polygon counts in Region A, 1950-2001.

In Region B, polygon counts generally decrease with time, and greatest single type of polygons mapped are shrubs (Figure 3-17). Similar to Region A, Region B has a relatively high number of polygon counts in 1976.

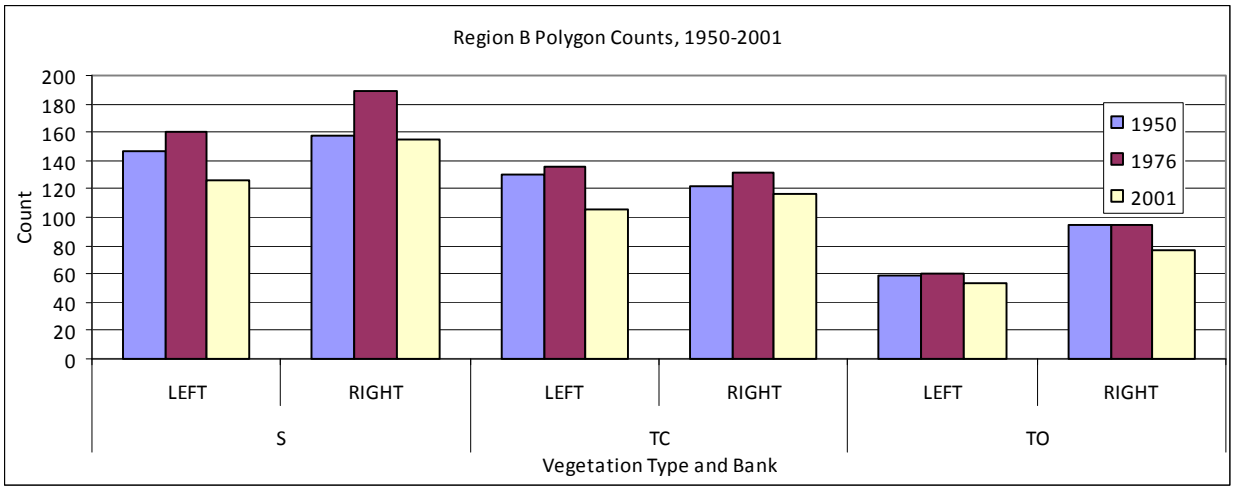

Figure 3-17. Polygon counts in Region B, 1950-2001.

In regions C and D, the shrub vegetation class has the highest number of mapped polygons (Figure 3-18 and Figure 3-19). Similar to Regions A and B, these lower river segments show Open Timber as the vegetation class having the fewest mapped polygons through time. In Regions C and D, the number of shrub polygons dropped between 1950 and 2001. No such trends are observable with either the Open Timber or Closed Timber vegetation type.

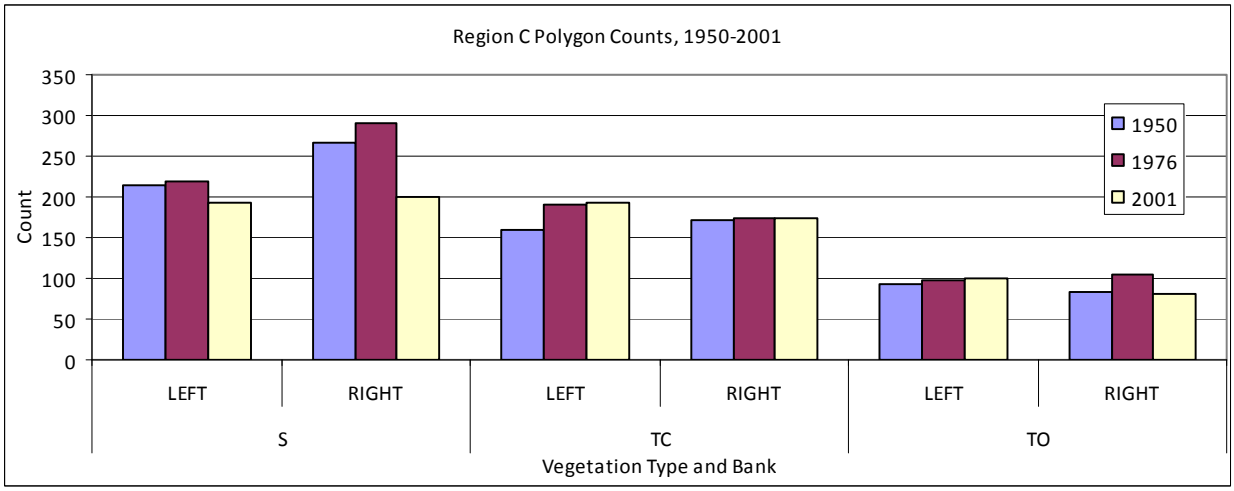

Figure 3-18. Polygon counts in Region C, 1950-2001.

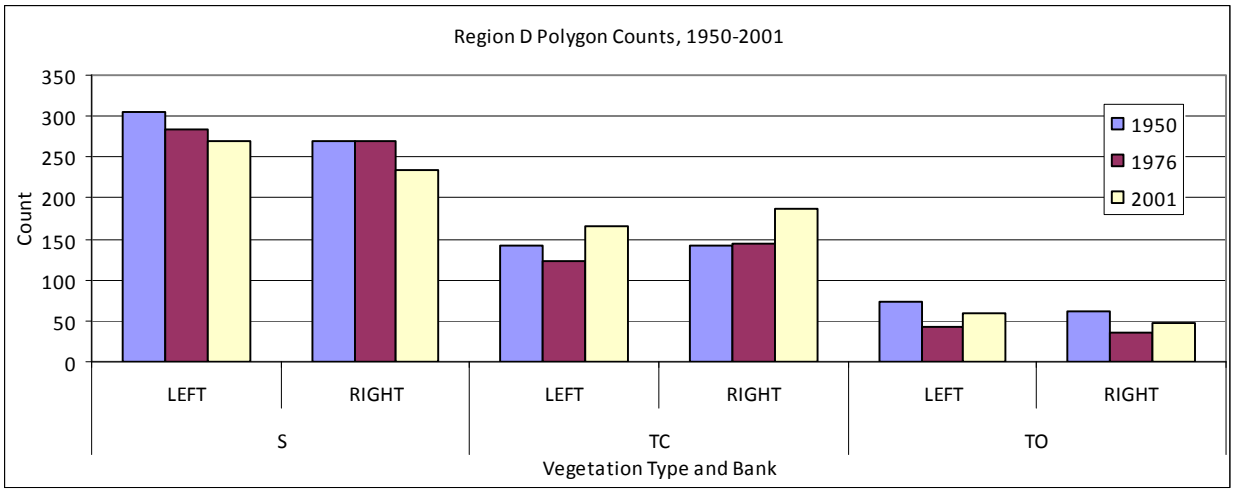

Figure 3-19. Polygon counts in Region D, 1950-2001.

One way to assess the change in number of polygons through time is to calculate the percent change for any given time period. When the 1950 polygon count data are directly compared to the 2001 data, there is a predominant loss in total number of polygon counts during that 50-year time frame (Figure 3-20). The most notable exception to this trend is in Region D, where the counts of Closed Timber markedly increased, while the number of Open Timber polygons commensurately dropped.

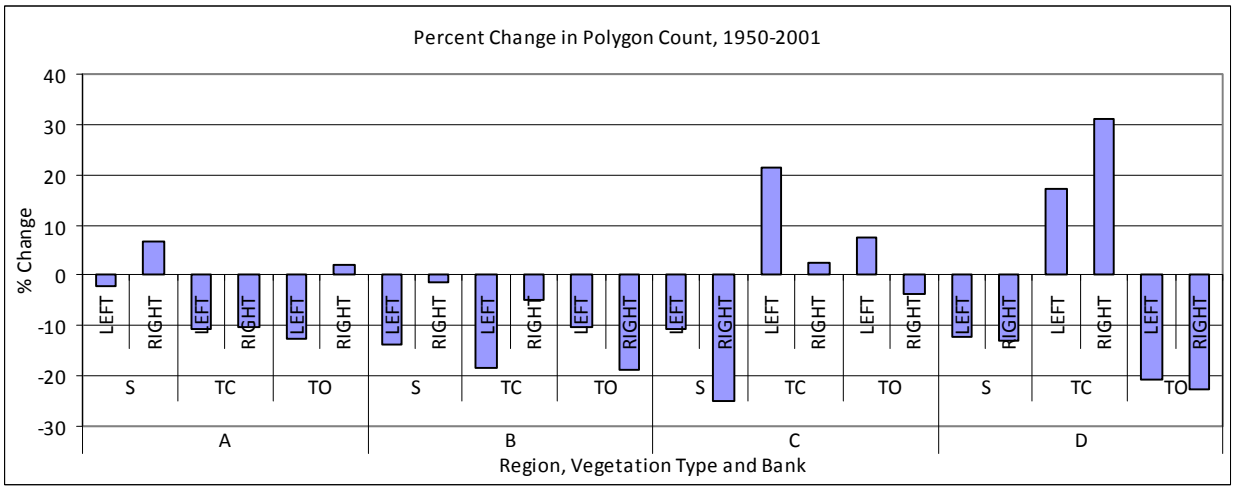

Figure 3-20. Percent change in polygon counts from 1950-2001.

3.3 Perimeter-Area Ratio

The Perimeter-Area Ratio is a general parameter that helps define the complexity of a polygon's shape. This can be important in both tracking the characteristics of vegetation patches and in assessing a vegetation patch's appropriateness for supporting types of ecologic processes. The relationship between the perimeter of a polygon and its area defines how much "edge" the polygon has relative to its core. A polygon with a large perimeter length relative to its area has a relatively large boundary, or edge. This would be the case with a narrow, elongated mapped polygon, such as a thin line of shrub that has colonized a topographic swale on a point bar. In contrast, a perfect circle has a relatively low perimeter length relative to core area. The quantification of this relationship for mapped riparian vegetation polygons can provide insight as to the relative extent of "edge" habitat in the riparian system. Commonly, the edges of riparian vegetation types, or the boundary between two vegetation types, provide unique habitat elements relative to the core of a given map unit. For example, where mature cottonwood forests (closed timber) transitions to shrub, edge habitat is created that integrates both vegetation types.

The Perimeter Area Ratio ("PARA") is defined as the ratio of a polygon perimeter to its area. For each mapped polygon in the stream corridor, a PARA value has been calculated. Although certain plants and animals have distinct PARA preferences when selecting habitats, these preferences vary by species, such that it is difficult to identify high quality edge habitat conditions on a broad scale. As such, the PARA data provided herein is intended only to illustrate the changes in the extent of overall edge habitat over the 50-year study window, rather than to determine specific habitat quality. For purposes of brevity, only the PARA values for shrub habitat are presented in this section; reach-based values calculated for all riparian vegetation mapping units are compiled in Appendix D.

Within Region A, several reaches show a relatively large increase in PARA shrub values between 1950 and 1976 (red circles; Figure 3-21). For almost all reaches the maximum PARA values for shrub polygons occur in 1976. The highest PARA values in Region A are consistently found in Reach A5, which is immediately downstream of the Boulder River confluence at Big Timber.

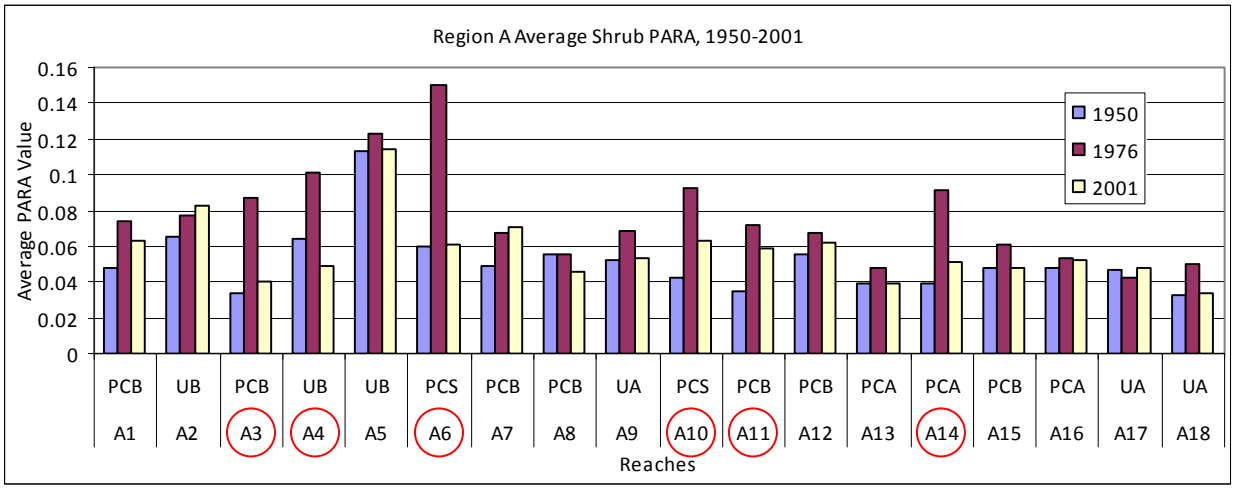

Figure 3-21. Average Shrub PARA values from 1950 to 2001, Region A.

The Shrub PARA data for Region B typically show a slight increase from 1950-1976, followed by a consistent, although subtle, drop in values from 1976 to 2001 (Figure 3-22). This trend suggests that irregular floodplain shrub patches may have consolidated during the last 50 years.

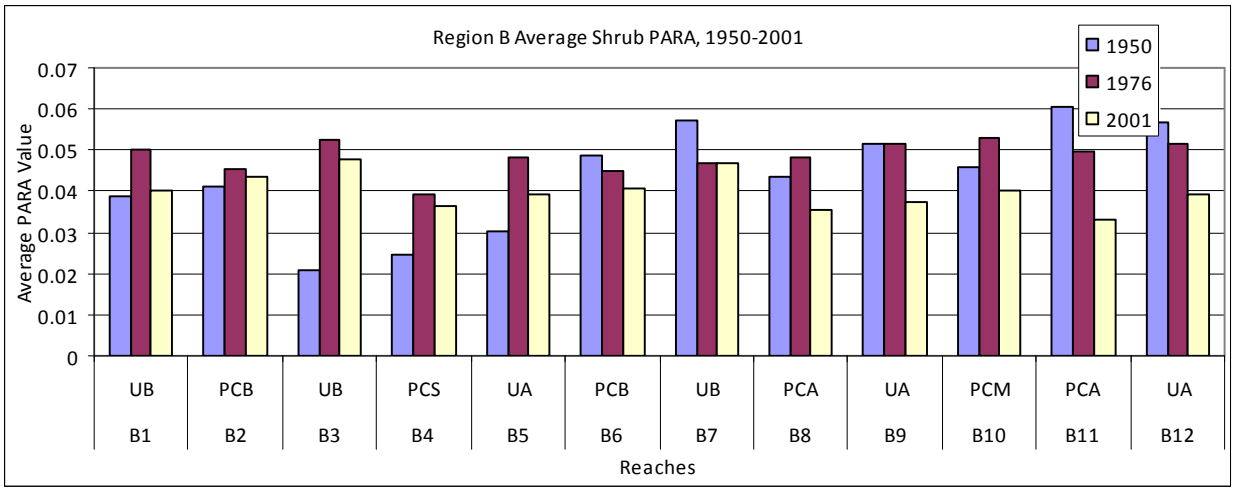

Figure 3-22. Average Shrub PARA values from 1950 to 2001, Region B.

Region D shows a relatively wide range in PARA Shrub values for any given time frame (Figure 3-23). There are no consistent trends through time among reaches; some reaches show continual increases, while others show a drop in PARA values from 1950-2001.

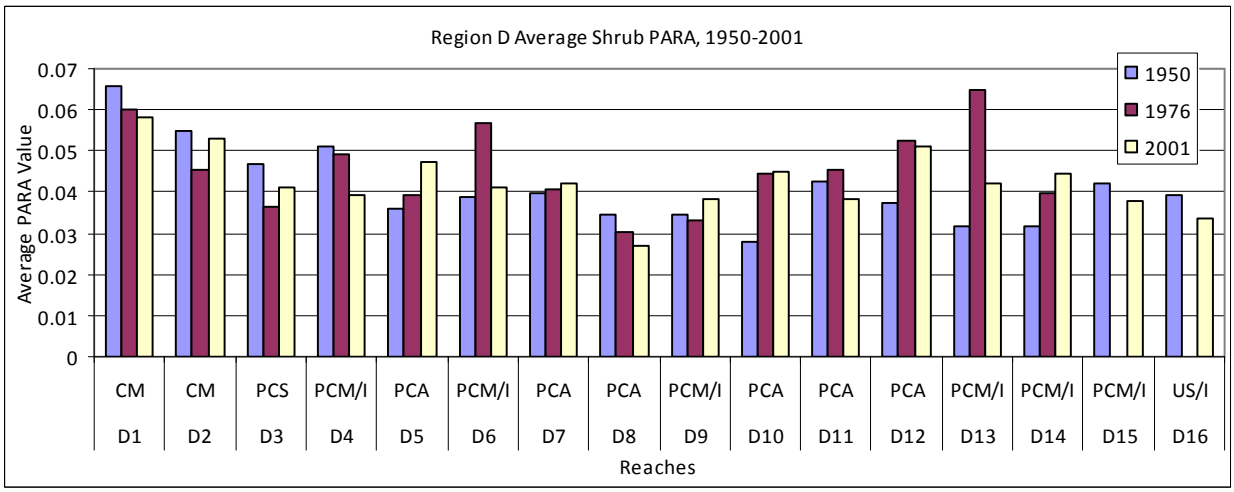

Figure 3-23. Average Shrub PARA values from 1950 to 2001, Region D.

3.4 Euclidean Nearest-Neighbor Distance

An interesting metric that can be used to describe riparian vegetation conditions defines the minimum distance between polygons of a given vegetation type. To describe this distance, a Euclidean Nearest-Neighbor Distance (NND) value was calculated in the GIS for each vegetation polygon. This simple metric measures the shortest straight-line distance between two polygons of the same type. This measure is intended to show the relative accessibility of multiple polygons of a similar vegetation type. Since this accessibility relates to habitat use, it was assumed that the primary river channel serves as a major barrier to terrestrial movement. As such, NND values were only calculated for polygons on the same bank. Also, note that NND calculations were made across reach and region boundaries so as to not artificially constrain polygon connectivity.

Where polygons have high NND values, the vegetation patch is relatively isolated from others of the same type on the same bank. Conversely, low NND values indicate that similar polygons are in close proximity. A summary of NND values can give an idea of relative ecological connectivity within a landscape. It is important to note, however, that connectivity is highly dependent on the scale perceived by the organism or ecological process in question. Each organism (or process) has a limit to how far it can easily travel between patches. Because of this subjectivity, NND values cannot be used as a substitute for connectivity values in relation to any specific organism or process. The following figures illustrate NND values for each of the four study regions. Complete NND values can be found in Appendix E.

In Region A (Figure 3-24), the Open Timber vegetation type on the right bank of the river reflects the only notable trend in average NND values, increasing approximately 450m during from 1950-2001. This indicates that the right bank of the river experienced greater spacing between Open Timber polygons over time. The remaining vegetation types remain largely unchanged.

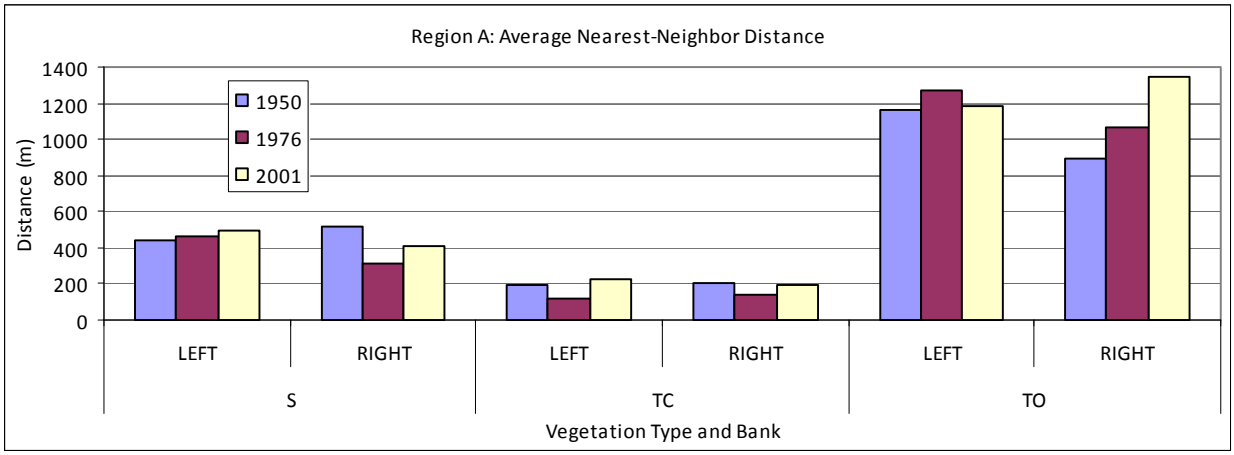

Figure 3-24. Nearest-Neighbor Distance within Region A, 1950 to 2001.

Region B (Figure 3-25) depicts a relatively flat trend in average NND over time. It is readily apparent that, similar to Region A, the Open Timber vegetation polygons are consistently more

widely spaced than Shrub and Closed Timber. This pattern continues for Region C (Figure 3-26) and Region D (Figure 3-27).

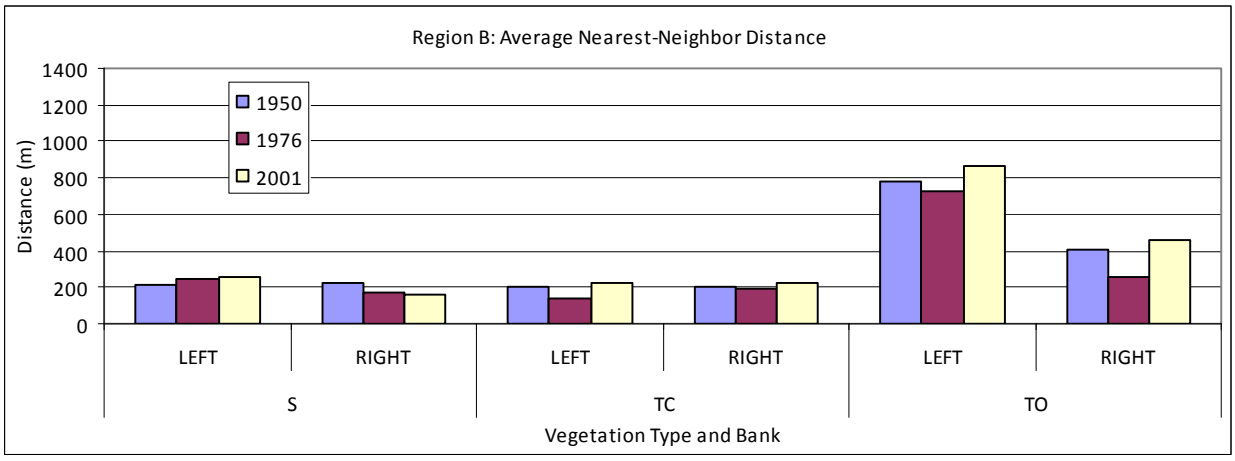

Figure 3-25. Nearest-Neighbor Distance within Region B, 1950 to 2001.

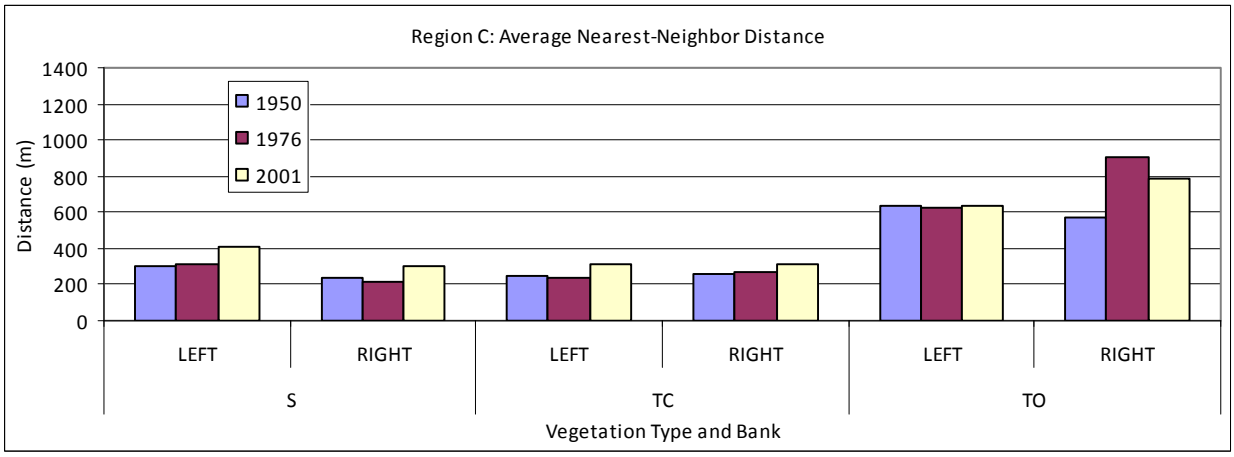

Figure 3-26. Nearest-Neighbor Distance within Region C, 1950 to 2001.

Similar to Region A, the most significant change in Region D NND values through time is with the Open Timber vegetation type (Figure 3-27). On the left bank, there is a significant increase in NND from 1950 to 1976, followed by a decrease in 2001. On the right bank, NND values steadily increase over time. Shrub and Closed Timber types remain largely unchanged during the study period.

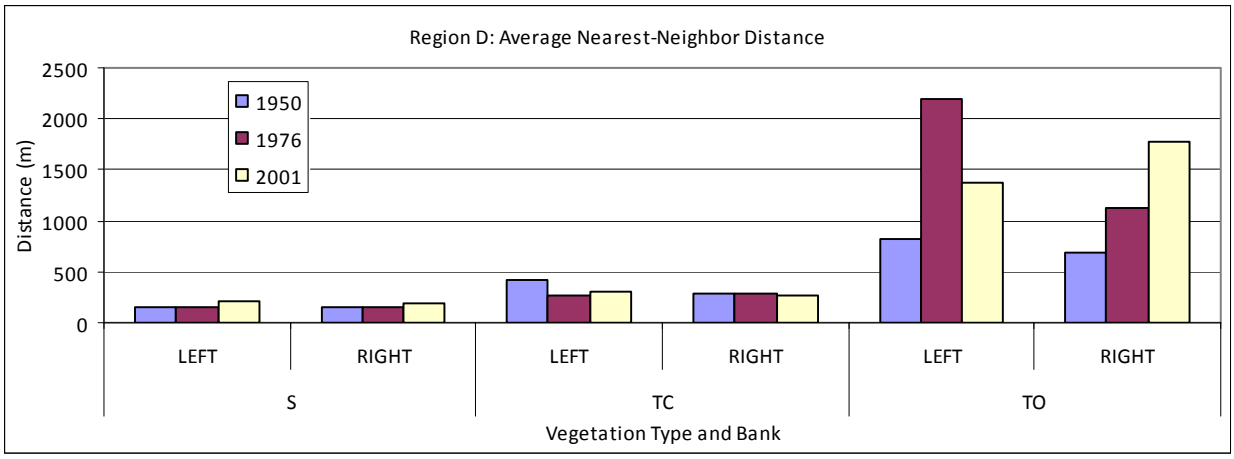

Figure 3-27. Nearest-Neighbor Distance within Region D, 1950 to 2001.

The NND data can also be considered with respect to geomorphic reach type. In reach types that are inherently more dynamic, for example, such as braided reaches, rates of vegetation turnover are likely higher than in more stable confined reaches. If vegetation turnover is higher, it may be reflected in increased polygon diversity, shorter distances between patches, and more year-to-year variability.

In Region A (Figure 3-28), average NND values are fairly low in the unconfined reach types that contain multiple anabranching side channels around islands (UA) and secondary braided channels around open gravel bars (UB). This trend is consistent for all vegetation types, with the exception of the Open Timber polygons measured in the Unconfined Braided (UB) reaches. The distance measured between the Open Timber vegetation polygons is consistently high for all reach types.

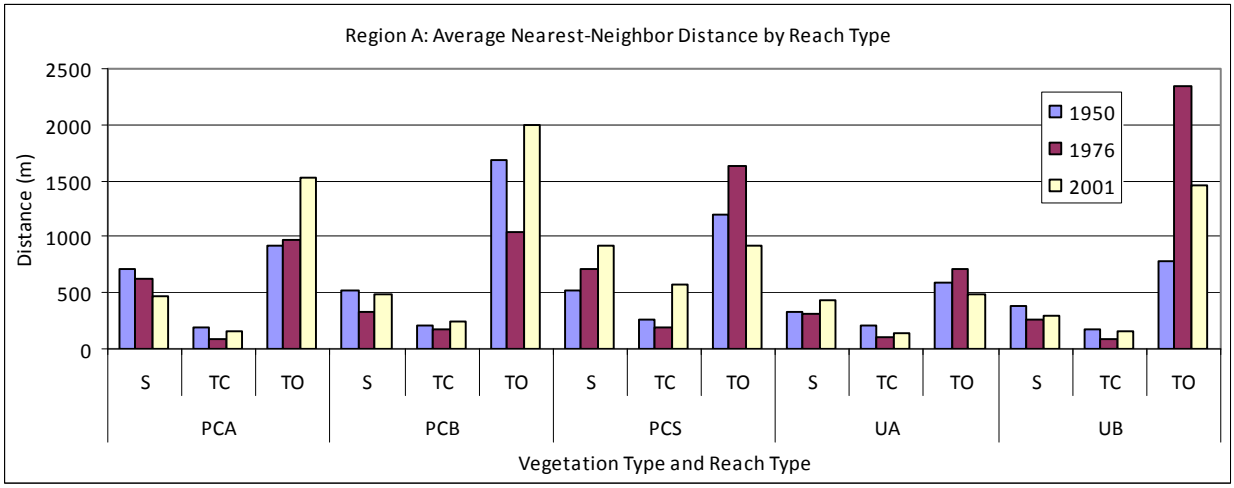

Figure 3-28. Nearest-Neighbor Distance within Region A, 1950-2001, summarized by reach type.

In Region B (Figure 3-29), the distances measured between vegetation polygons of a given type are consistenly low in the unconfined channel types (UA and UB), suggesting that turnover rates in these reaches creates patch complexity. One notable trend in Region B is with the Open Timber polygons measured in the Partially Confined Braided (PCB) reach types; average NND values of 750m in 1950 increased to 1500m by 2001. A similar doubling in Open Timber values occurs in the Partially Confined Anabranching (PCA) category.

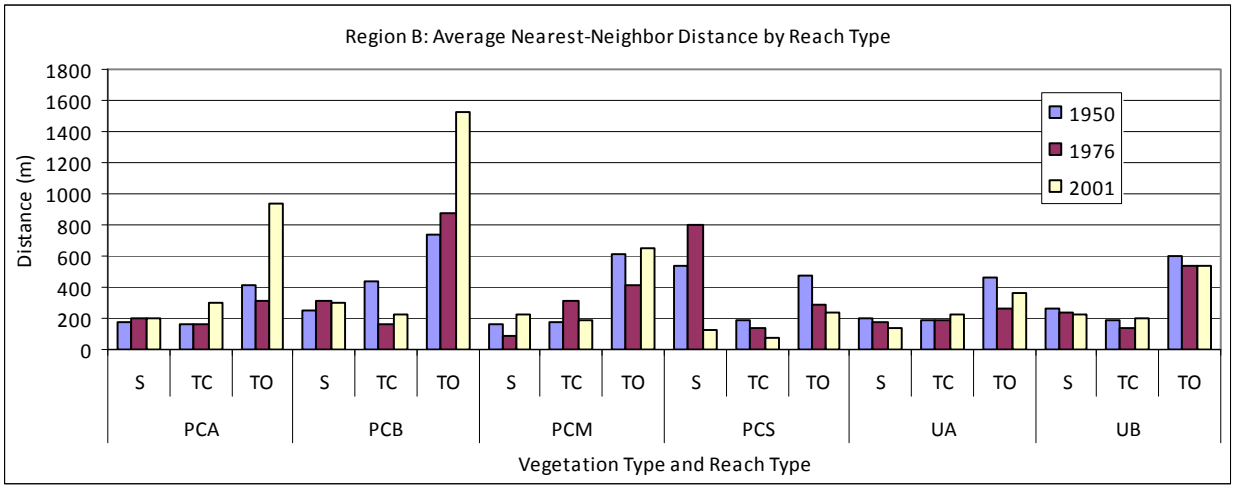

Figure 3-29. Nearest-Neighbor Distance within Region B, 1950-2001, summarized by reach type.

Region C (Figure 3-30) contains two confined reach types: Confined Meandering (CM) and Confined Straight (CS). On average, these two types show higher NND values than the others, which is likely a reflection of the diminished riparian turnover rate characteristic of geologically confined river segments.

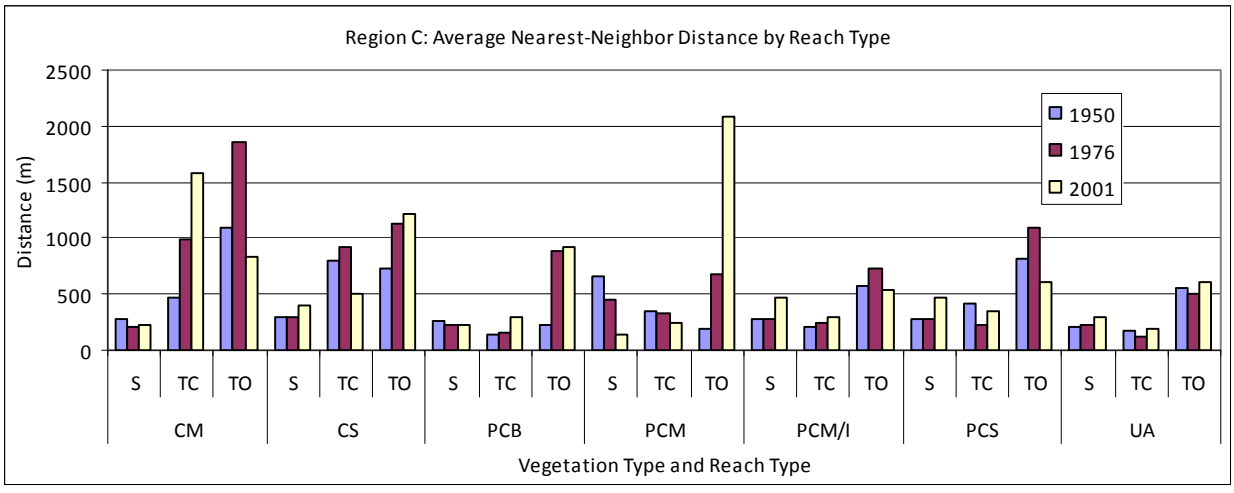

Figure 3-30. Nearest-Neighbor Distance within Region C, 1950-2001, summarized by reach type.

Figure 3-31 shows NND values for Region D. As in the other regions, the Open Timber type shows generally higher values than Shrub and Closed Timber. The reach type that has the

highest overall values is Confined Meandering (CM), which, similar to Region C, is likely a reflection of relatively low floodplain turnover rates.

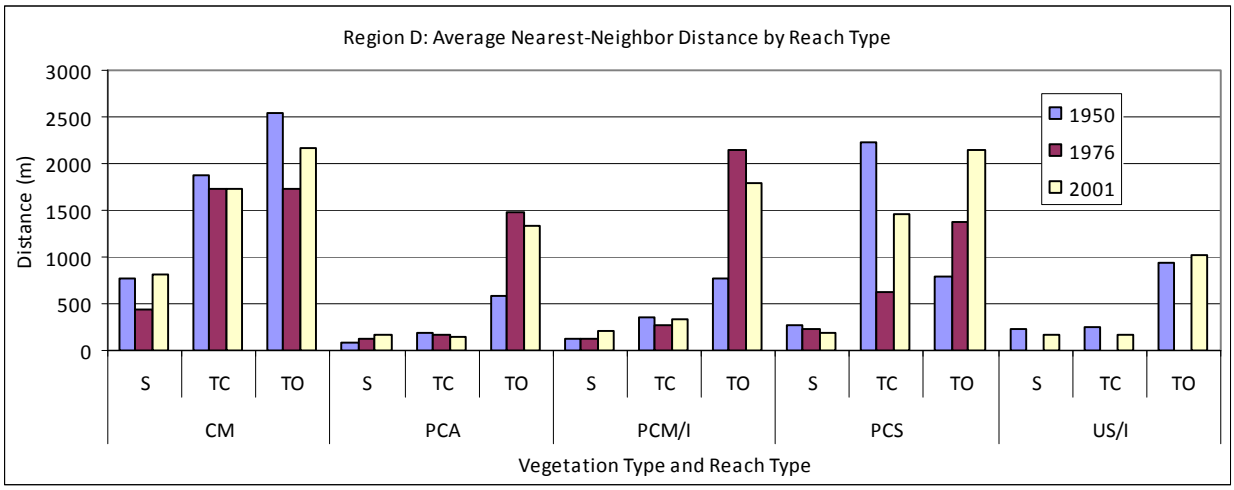

Figure 3-31. Nearest-Neighbor Distance within Region D, 1950-2001, summarized by reach type.

4 Conclusions

The various metrics presented in this report show a fairly complex, non-linear trend in riparian vegetation extents through time within the Yellowstone River corridor. In many reaches, the results show that where meander migration occurs, riparian cover shifts from one bank to another. This indicates that where riparian vegetation is lost due to erosion of a cutbank, it is able to regenerate on the point bar on the opposite bank. These linked processes of meander migration and riparian succession are important concepts in river management and maintenance of riparian integrity. A good example of this process is shown in Reach A3, which is just upstream of Big Timber (Figure 3-1).

In other areas there has been a net loss in woody riparian vegetation cover through time. This loss includes conversion of both shrubs and timber polygons to non-woody herbaceous vegetation. In some areas, this change appears to have occurred in reaches that have undergone agricultural development, road/Interstate development, or urban growth.

The total extent of woody vegetation cover in the Yellowstone River corridor tends to be lowest in reaches that are either straight or confined by erosion-resistant geology. In region C, for example, the confined and straight channel types (Figure 3-14) support a much lower extent of woody riparian cover relative to more dynamic reach types.

With the exception of Region D, downstream of the Powder River, the number of woody riparian vegetation polygons identified in 1950 is lower than that of 2001 (Figure 3-20). Below the Powder River, a reduction in the number of Open Timber polygons appears to correlate to a commensurate increase in Close Timber polygons, suggesting maturation of riparian forest in the lower corridor area.

The Perimeter Area Ratio (PARA) values suggest that with respect to Shrub polygons, there has been some consolidation and simplification of shrub polygon shapes since 1950. Higher values typical of 1950 indicate more elongate or irregular polygon shapes, whereas the lower subsequent values suggest that patches have taken on more concentrated area.

When vegetation polygons are assessed in terms of the distance to their nearest neighbor, it is clear that the Open Timber polygons tend to be widely spread from one another. Furthermore, reaches that are geologically confined tend to have greater distances between similar polygon types, which reflects limited floodplain turnover rates due to the erosion resistance of the channel margin. The lack of channel migration in these reaches appears to correlate to a lack of riparian colonization and complexity, expressed by an increased distance between similar vegetation polygons (Figure 3-30).

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Appendix A. Reach Lengths, Classification, and General Location

Table A-4-1. Summary of reach types and geographic location

Reach Identification	Length (km)	County	Classification	Comments
A1	5.4	Sweetgrass	PCB: Partially confined braided	*Springdale*: Low primary sinuosity; large open bar area; extensive armoring
A2	11.1	Sweetgrass	UB: Unconfined braided	*Grey Bear* fishing access
A3	8.6	Sweetgrass	PCB: Partially confined braided	Upstream of *Big Timber*; Hell Creek Formation valley wall
A4	5.6	Sweetgrass	UB: Unconfined braided	To *Boulder River* confluence; encroachment at Big Timber; extensive armor
A5	5.2	Sweetgrass	UB: Unconfined braided	Low Qat1 terrace on right bank
A6	4.8	Sweetgrass	PCS: Partially confined straight	Channel closely follows left valley wall
A7	15.9	Sweetgrass	PCB: Partially confined braided	*Greycliff*: Narrow valley bottom with alluvial fan margins
A8	8.2	Sweetgrass	PCB: Partially confined braided	Floodplain isolation behind interstate and R/R
A9	6.2	Sweetgrass Stillwater	UA: Unconfined anabranching	To *Reed Pt*; extensive secondary channels in corridor
A10	6.9	Stillwater	PCS: Partially confined straight	Channel closely follows left valley wall
A11	11.2	Stillwater	PCB: Partially confined braided	High right bank terrace with bedrock toe; *I-90 bridge* crossing
A12	9.8	Stillwater	PCB: Partially confined braided	To *Stillwater* confluence
A13	5.8	Stillwater	PCA: Partially confined anabranching	*Columbus*; extensive armoring, broad islands
A14	12.5	Stillwater	PCA: Partially confined anabranching	Valley bottom crossover
A15	9.5	Stillwater, Carbon	PCB: Partially confined braided	Follows Stillwater/Carbon County line
A16	12.4	Stillwater, Carbon	PCA: Partially confined anabranching	*Park City*: Major shift in land use, and increase in valley bottom width
A17	10.4	Yellowstone Carbon	UA: Unconfined anabranching	To *Laurel;* WAI Reach A
A18	3.8	Yellowstone	UA: Unconfined anabranching	To Clark Fork; land use change to row crops; WAI Reach A
B1	24.6	Yellowstone	UB: Unconfined braided	Extensive armoring *u/s Billings*; WAI Reaches B,C,D
B2	9.8	Yellowstone	PCB: Partially confined braided	*Billings*; WAI Reach E

Table A-4-1. Summary of reach types and geographic location

Reach Identification	Length (km)	County	Classification	Comments
B3	7.0	Yellowstone	UB: Unconfined braided	Wide corridor d/s *Billings*; WAI Reach F
B4	6.1	Yellowstone	PCS: Partially confined straight	Channel closely follows right valley wall; extensive bank armor
B5	12.0	Yellowstone	UA: Unconfined anabranching	*Huntley:* includes *Spraklin Island*
B6	9.9	Yellowstone	PCB: Partially confined braided	Channel closely follows left valley wall
B7	13.9	Yellowstone	UB: Unconfined braided	Unconfined reach
B8	14.7	Yellowstone	PCA: Partially confined anabranching	*Pompey's Pillar*
B9	7.5	Yellowstone	UA: Unconfined anabranching	Meander cutoff isolated by railroad
B10	11.6	Yellowstone	PCM: Partially confined meandering	Encroached
B11	13.1	Yellowstone	PCA: Partially confined anabranching	To *Custer Bridge*
B12	7.3	Yellowstone	UA: Unconfined anabranching	To *Bighorn River* confluence
C1	9.5	Treasure	UA: Unconfined anabranching	From *Bighorn* confluence: Includes 1 mile of left bank valley wall control; Extensive bank protection.
C2	8.9	Treasure	PCB: Partially confined braided	To *Myers Br* (RM 285.5); Railroad adjacent to channel on valley wall; low sinuosity
C3	7.6	Treasure	UA: Unconfined anabranching	To *Yellowstone Diversion*: very sinuous; large meanders, extensive bars; historic avulsion
C4	6.1	Treasure	PCB: Partially confined braided	Below *Yellowstone Diversion*
C5	5.1	Treasure	PCS: Partially confined straight	*Hysham*
C6	9.1	Treasure	UA: Unconfined anabranching	*Mission Valley*
C7	14.7	Treasure	UA: Unconfined anabranching	*Mission Valley*
C8	10.4	Treasure Rosebud	PCS: Partially confined straight	Rosebud/Treasure County Line
C9	17.2	Rosebud	UA: Unconfined anabranching	*Hammond Valley*
C10	11.0	Rosebud	PCM: Partially confined meandering	*Forsyth*
C11	18.3	Rosebud	PCM/I: Partially confined meandering/islands	To *Cartersville Bridge*
C12	16.2	Rosebud	PCM/I: Partially confined meandering/islands	*Rosebud*; numerous meander cutoffs
C13	10.8	Rosebud	PCM/I: Partially confined meandering/islands	Valley bottom crossover
C14	19.6	Rosebud Custer	PCM/I: Partially confined meandering/islands	Series of meander bends

Table A-4-1. Summary of reach types and geographic location

Reach Identification	Length (km)	County	Classification	Comments
C15	6.0	Custer	PCS: Partially confined straight	Very low riparian vegetation
C16	11.6	Custer	PCM/I: Partially confined meandering/islands	to *Miles City*
C17	7.2	Custer	PCS: Partially confined straight	*Miles City; Tongue River*
C18	5.2	Custer	PCS: Partially confined straight	Channel follows left valley wall
C19	17.9	Custer	CS: Confined straight	Confined
C20	12.2	Custer Prairie	CS: Confined straight	Confined
C21	15.2	Custer Prairie	CM: Confined meandering	To *Powder River;* confined
D1	19.5	Prairie	CM: Confined meandering	To *Terry Bridge*; confined
D2	17.0	Prairie	CM: Confined meandering	To *Fallon, I-90 Bridge*; confined
D3	13.4	Prairie Dawson	PCS: Partially confined straight	Hugs right bank wall; into Dawson County
D4	17.7	Dawson	PCM/I: Partially confined meandering/islands	
D5	20.3	Dawson	PCA: Partially confined anabranching	Long secondary channels; to *Glendive*
D6	8.9	Dawson	PCM/I: Partially confined meandering/islands	*Glendive*
D7	12.3	Dawson	PCA: Partially confined anabranching	
D8	16.4	Dawson	PCA: Partially confined anabranching	To *Intake*
D9	5.6	Dawson	PCM/I: Partially confined meandering/islands	Downstream of *Intake*
D10	18.3	Dawson Wibaux Richland	PCA: Partially confined anabranching	Vegetated islands
D11	10.3	Richland	PCA: Partially confined anabranching	*Elk Island:* Very wide riparian; marked change in channel course since 1981 geologic map base
D12	21.9	Richland	PCA: Partially confined anabranching	Secondary channel on valley wall; Sinuous; long abandoned secondary channel
D13	13.8	Richland	PCM/I: Partially confined meandering/islands	
D14	23.1	Richland, McKenzie	PCM/I: Partially confined meandering/islands	Into *McKenzie County, North Dakota*: High sinuosity
D15	9.6	McKenzie	PCM/I: Partially confined meandering/islands	
D16	11.9	McKenzie	US/I: Unconfined straight/islands	*To mouth*: low sinuosity; alternate bars; vegetated islands

Appendix B. Channel Classification Scheme

Table B-4-2. Channel classification

Type Abbrev.	*Classification*	*n*	*Slope (ft/ft)*	*Planform/ Sinuosity*	*Major Elements of Channel Form*
UA	Unconfined anabranching	12	<.0022	Mult. Channels	Primary thread with vegetated islands that typically exceed 3X average channel width
PCA	Partially confined anabranching	18	<.0023	Mult. Channels	Partial bedrock control; Primary thread with vegetated islands that exceed 3X average channel width
UB	Unconfined braided	6	<.0024	Mult. Channels	Primary thread with unvegetated gravel bars; Average braiding parameter generally >2 for entire reach
PCB	Partially confined braided	13	<.0022	Mult. Channels	Partial bedrock control; primary thread with gravel bars; Average braiding parameter generally >2
PCM	Partially confined meandering	4	<.0014	>1.2	Partial bedrock control; main channel thread with point bars; average braiding parameter <2
PCS	Partially confined straight	11	<.0020	<1.3	Partial bedrock control; low sinuosity channel along valley wall
PCM/I	Partially confined meandering/islands	11	<.0007	Mult. Channels	Partial bedrock control; sinuous main thread with stable, vegetated bars
CS	Confined straight	5	<.0001	<1.2	Bedrock confinement; low sinuosity
CM	Confined meandering	7	<.0008	<1.5	Bedrock confinement; sinuous; uniform width; small point bars
US/I	Unconfined straight/islands	1	<.0003	<1.2	Low sinuosity with vegetated bars

Appendix C. Summary statistics of riparian polygon acreage

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
A1	Min	0.9	0.3	0.0	0.8	0.3	0.4	14.7	16.0	6.2
	Max	20.0	11.9	5.3	219.1	149.9	171.1	14.7	29.8	26.6
	Average	8.3	3.6	2.6	39.0	28.0	23.4	14.7	24.2	18.9
	Sum	49.7	21.7	20.7	312.2	223.7	233.7	14.7	72.6	56.8
	Count	6.0	6.0	8.0	8.0	8.0	10.0	1.0	3.0	3.0
A2	Min	0.5	0.3	0.2	0.2	0.4	0.4	1.5	2.7	2.2
	Max	20.4	13.8	13.6	56.5	51.0	35.6	18.5	42.6	39.2
	Average	3.7	3.3	3.4	13.5	10.1	11.5	7.6	14.4	11.1
	Sum	66.2	69.9	106.7	430.9	352.8	275.2	45.9	100.9	121.8
	Count	18.0	21.0	31.0	32.0	35.0	24.0	6.0	7.0	11.0
A3	Min	1.1	0.0	1.4	0.5	0.1	0.9		2.0	9.0
	Max	43.3	29.5	38.3	116.9	108.3	104.6		20.9	32.0
	Average	15.8	4.4	10.8	12.8	13.2	20.5		11.5	17.9
	Sum	142.0	74.5	97.3	358.4	410.6	347.8		23.0	53.7
	Count	9.0	17.0	9.0	28.0	31.0	17.0		2.0	3.0
A4	Min	0.5	0.1	1.7	1.9	1.5	1.5	0.7	3.9	5.6
	Max	5.1	23.0	7.3	57.5	40.4	48.0	8.9	9.7	12.3
	Average	2.4	2.7	3.6	18.4	11.3	14.7	5.6	6.4	8.4
	Sum	22.0	46.6	21.7	275.5	181.0	205.3	22.6	19.1	25.2
	Count	9.0	17.0	6.0	15.0	16.0	14.0	4.0	3.0	3.0
A5	Min	0.3	0.1	0.1	1.7	1.4	0.7	3.8	1.3	6.9
	Max	1.8	2.3	1.5	8.4	10.6	17.1	11.9	7.1	6.9
	Average	1.1	0.8	0.8	4.3	4.4	5.1	7.5	4.8	6.9
	Sum	2.2	6.6	3.3	55.9	61.1	51.3	29.8	14.5	6.9
	Count	2.0	8.0	4.0	13.0	14.0	10.0	4.0	3.0	1.0
A6	Min	0.7	0.1	2.9	0.6	0.3	0.3	20.4	17.1	2.2
	Max	17.0	5.4	2.9	18.0	13.3	10.8	53.8	25.3	23.9
	Average	5.2	1.2	2.9	5.2	3.7	3.8	37.1	21.2	10.6
	Sum	46.7	8.2	2.9	26.0	29.6	15.0	74.2	42.4	42.3
	Count	9.0	7.0	1.0	5.0	8.0	4.0	2.0	2.0	4.0
A7	Min	0.5	0.2	0.3	0.1	0.1	0.1	1.8	2.7	0.1
	Max	36.8	28.6	15.4	87.2	87.7	80.3	38.2	48.3	40.8
	Average	6.8	5.0	4.8	18.2	8.2	14.2	14.2	21.0	11.7
	Sum	136.8	75.3	100.0	417.7	391.6	382.4	99.3	105.0	93.2
	Count	20.0	15.0	21.0	23.0	48.0	27.0	7.0	5.0	8.0
A8	Min	0.9	0.3	0.8	2.0	0.6	2.1	6.5	2.2	18.8
	Max	47.4	35.9	51.2	59.3	37.9	55.7	11.5	38.6	18.8
	Average	8.0	6.4	8.6	14.2	11.5	16.4	9.0	15.3	18.8
	Sum	135.4	121.3	172.5	312.5	206.6	296.0	18.0	106.9	18.8
	Count	17.0	19.0	20.0	22.0	18.0	18.0	2.0	7.0	1.0
A9	Min	0.7	0.3	0.8	0.4	0.6	2.2	4.6	1.9	5.2
	Max	15.5	18.6	30.1	60.7	53.8	71.0	53.8	15.6	50.1
	Average	4.5	3.8	7.2	14.8	14.7	22.8	21.8	8.7	27.8
	Sum	49.3	67.6	93.5	148.2	191.4	228.3	130.6	52.3	83.5
	Count	11.0	18.0	13.0	10.0	13.0	10.0	6.0	6.0	3.0

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
A10	Min	0.7	0.2	1.5	1.6	0.5	2.9	1.3	12.4	1.9
	Max	20.8	7.1	14.5	57.2	81.3	81.9	5.9	12.4	38.4
	Average	8.5	2.9	4.5	17.1	14.0	19.3	3.2	12.4	11.6
	Sum	51.2	20.4	27.0	221.9	210.2	154.8	9.6	12.4	69.4
	Count	6.0	7.0	6.0	13.0	15.0	8.0	3.0	1.0	6.0
A11	Min	0.5	0.0	0.9	0.4	1.1	0.1	2.4	3.1	10.8
	Max	44.8	29.4	25.3	171.9	58.2	100.1	15.5	34.2	39.4
	Average	14.2	6.5	5.4	22.0	13.0	12.7	8.2	13.9	23.2
	Sum	170.4	137.5	81.6	396.8	194.3	229.1	65.3	97.3	93.0
	Count	12.0	21.0	15.0	18.0	15.0	18.0	8.0	7.0	4.0
A12	Min	0.6	0.4	0.6	2.1	0.2	0.9	3.0	5.5	3.1
	Max	11.1	18.1	21.3	55.6	58.1	58.9	15.6	10.5	7.9
	Average	4.7	4.1	4.9	12.7	10.2	9.7	8.6	7.2	5.8
	Sum	89.9	86.6	63.5	202.5	203.3	223.8	42.8	21.6	23.0
	Count	19.0	21.0	13.0	16.0	20.0	23.0	5.0	3.0	4.0
A13	Min	0.7	1.6	2.6	0.0	2.6	5.9	2.5	6.2	4.7
	Max	22.3	9.7	15.1	85.9	100.0	102.3	20.6	34.0	4.7
	Average	14.4	5.6	8.9	24.2	28.4	31.2	10.3	20.1	4.7
	Sum	71.8	22.5	44.6	290.9	256.0	249.8	31.0	40.2	4.7
	Count	5.0	4.0	5.0	12.0	9.0	8.0	3.0	2.0	1.0
A14	Min	1.2	0.2	1.3	1.3	0.5	0.9	0.4	1.6	0.7
	Max	4.8	10.0	20.9	146.2	107.9	137.3	33.2	114.5	35.7
	Average	3.0	2.4	4.9	22.1	15.6	20.3	11.8	25.9	15.9
	Sum	6.0	24.3	44.2	729.0	563.0	629.8	106.2	181.0	111.0
	Count	2.0	10.0	9.0	33.0	36.0	31.0	9.0	7.0	7.0
A15	Min	0.0	0.3	0.4	1.0	1.3	1.6	2.1	13.1	9.8
	Max	80.3	32.2	65.3	105.0	137.7	170.7	12.2	50.0	73.0
	Average	10.0	5.5	11.1	23.2	29.9	53.5	7.0	25.1	36.1
	Sum	110.2	49.2	88.8	487.8	358.9	427.9	21.1	100.5	108.2
	Count	11.0	9.0	8.0	21.0	12.0	8.0	3.0	4.0	3.0
A16	Min	0.7	0.2	0.7	1.4	0.3	0.9	1.8	1.4	1.8
	Max	128.0	83.6	72.3	90.3	244.8	245.1	198.1	92.8	38.6
	Average	15.2	8.7	10.7	23.2	17.0	29.2	22.4	15.0	26.7
	Sum	273.5	182.0	171.6	440.6	610.9	672.2	291.8	149.8	133.4
	Count	18.0	21.0	16.0	19.0	36.0	23.0	13.0	10.0	5.0
A17	Min	0.2	0.5	0.0	0.3	0.0	1.0	2.4	1.3	0.4
	Max	22.7	88.6	21.9	213.6	142.1	156.2	89.4	52.3	129.8
	Average	5.5	16.6	5.6	36.2	22.2	32.2	19.9	21.3	22.1
	Sum	83.1	182.6	78.5	723.3	777.5	677.1	258.8	191.6	331.4
	Count	15.0	11.0	14.0	20.0	35.0	21.0	13.0	9.0	15.0
A18	Min	1.3	0.2	1.1	0.0	0.0	1.2	0.3	11.2	2.2
	Max	48.1	15.6	36.1	129.9	132.9	148.2	67.2	88.5	61.0
	Average	16.7	7.4	14.0	22.2	16.3	20.0	16.5	26.7	23.0
	Sum	234.4	103.2	125.9	355.0	341.4	319.6	115.3	160.1	206.9
	Count	14.0	14.0	9.0	16.0	21.0	16.0	7.0	6.0	9.0
B1	Min	0.9	0.4	0.5	0.4	0.2	0.8	1.9	1.1	0.0

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Max	44.3	211.9	49.8	97.4	139.8	253.9	132.1	43.4	168.8
	Average	11.5	12.8	12.8	27.4	20.1	34.6	25.3	15.1	17.8
	Sum	402.4	539.4	500.4	1262.6	1367.5	1385.2	556.9	272.5	446.2
	Count	35.0	42.0	39.0	46.0	68.0	40.0	22.0	18.0	25.0
B2	Min	1.9	0.3	1.1	3.0	0.8	1.9	6.1	8.1	11.8
	Max	87.6	41.0	40.7	59.3	90.7	125.5	87.3	58.1	43.3
	Average	16.4	9.5	7.2	17.5	13.4	25.8	35.5	31.4	24.7
	Sum	180.6	94.7	65.0	210.2	255.2	361.8	248.4	157.1	98.9
	Count	11.0	10.0	9.0	12.0	19.0	14.0	7.0	5.0	4.0
B3	Min	4.4	0.5	1.0	1.6	1.4	1.2	0.7	2.6	1.7
	Max	74.7	195.9	173.6	147.6	90.2	152.0	91.3	42.9	89.2
	Average	29.4	13.8	22.3	29.9	20.3	32.7	20.9	17.8	36.0
	Sum	205.9	385.2	356.1	448.2	507.7	523.3	292.9	106.5	179.9
	Count	7.0	28.0	16.0	15.0	25.0	16.0	14.0	6.0	5.0
B4	Min	7.6	1.2	1.8	2.5	2.4	1.2	4.0	2.9	1.9
	Max	29.2	7.6	34.1	111.8	129.6	136.5	26.2	34.4	40.6
	Average	17.1	4.9	14.2	35.4	40.3	23.2	17.8	17.7	13.1
	Sum	102.5	24.6	85.3	283.4	282.0	208.4	53.3	53.1	117.6
	Count	6.0	5.0	6.0	8.0	7.0	9.0	3.0	3.0	9.0
B5	Min	0.1	0.4	0.1	0.0	0.8	0.6	2.7	1.7	0.2
	Max	28.5	67.0	24.9	153.1	171.3	127.2	59.8	31.3	71.5
	Average	12.2	10.2	7.3	33.5	31.4	25.1	23.2	17.0	19.1
	Sum	268.2	286.5	174.3	636.7	784.5	678.9	370.4	220.5	420.8
	Count	22.0	28.0	24.0	19.0	25.0	27.0	16.0	13.0	22.0
B6	Min	1.1	1.0	0.5	1.5	0.9	0.4	1.2	0.7	0.7
	Max	81.4	33.0	110.7	96.3	139.5	147.3	28.0	98.0	22.3
	Average	10.2	7.0	13.4	34.6	24.9	20.5	10.6	20.1	8.9
	Sum	194.0	104.9	255.5	380.5	373.4	349.0	84.5	161.0	53.5
	Count	19.0	15.0	19.0	11.0	15.0	17.0	8.0	8.0	6.0
B7	Min	0.3	0.3	0.6	0.5	0.8	1.1	1.2	0.4	0.8
	Max	41.4	31.7	138.4	100.5	65.7	50.9	80.8	107.7	57.6
	Average	6.7	7.3	14.1	16.6	17.5	14.5	14.3	14.0	16.1
	Sum	308.9	301.0	535.6	430.9	333.4	420.4	272.3	419.0	160.9
	Count	46.0	41.0	38.0	26.0	19.0	29.0	19.0	30.0	10.0
B8	Min	0.3	0.5	0.9	0.6	0.8	0.7	1.4	1.8	2.9
	Max	72.9	79.9	93.2	105.1	72.0	115.3	91.2	47.9	96.4
	Average	11.4	9.2	16.0	14.8	18.9	26.8	22.4	14.2	23.0
	Sum	434.1	388.1	432.9	489.6	490.4	590.2	336.0	312.8	322.4
	Count	38.0	42.0	27.0	33.0	26.0	22.0	15.0	22.0	14.0
B9	Min	0.1	0.4	1.9	0.3	3.5	1.1	0.1	0.0	0.2
	Max	33.8	109.4	99.0	100.2	75.8	87.8	41.1	33.8	55.8
	Average	6.5	8.8	10.4	19.9	20.5	26.9	15.4	9.9	17.9
	Sum	208.0	289.6	270.5	357.8	266.2	269.1	76.9	88.7	161.2
	Count	32.0	33.0	26.0	18.0	13.0	10.0	5.0	9.0	9.0
B10	Min	0.0	0.2	0.4	0.0	1.4	1.8	0.8	1.6	5.3
	Max	54.3	35.8	115.1	64.0	30.8	75.1	138.5	76.0	45.7

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Average	8.1	7.8	19.2	15.8	12.8	27.3	16.2	19.0	17.5
	Sum	276.3	321.3	422.2	427.9	166.8	327.2	226.1	304.3	157.7
	Count	34.0	41.0	22.0	27.0	13.0	12.0	14.0	16.0	9.0
B11	Min	0.4	0.2	0.5	0.6	0.6	1.1	1.3	6.5	5.0
	Max	31.0	34.1	85.4	122.4	92.9	86.6	51.4	27.6	53.5
	Average	6.5	8.4	14.9	18.0	19.0	28.1	8.9	14.2	21.5
	Sum	219.3	319.5	462.4	504.7	531.0	422.1	169.4	155.7	215.2
	Count	34.0	38.0	31.0	28.0	28.0	15.0	19.0	11.0	10.0
B12	Min	0.5	0.7	0.6	3.2	0.8	0.6	0.0	0.5	0.3
	Max	62.3	49.2	66.6	91.5	131.1	56.8	30.5	47.0	112.3
	Average	10.4	7.7	13.9	25.2	30.7	17.3	9.7	9.0	26.0
	Sum	198.4	199.8	333.3	226.5	276.3	190.5	115.9	126.4	182.2
	Count	19.0	26.0	24.0	9.0	9.0	11.0	12.0	14.0	7.0
C1	Min	0.5	0.5	1.1	1.4	0.8	1.2	1.6	1.9	5.4
	Max	33.2	155.4	177.4	229.3	28.0	77.6	137.1	47.9	47.1
	Average	8.5	17.1	19.1	24.7	11.1	16.2	21.0	23.9	24.3
	Sum	169.9	411.4	477.9	468.6	177.1	355.7	188.7	287.1	121.5
	Count	20.0	24.0	25.0	19.0	16.0	22.0	9.0	12.0	5.0
C2	Min	0.9	0.3	1.4	0.1	0.0	2.0	4.7	0.3	1.8
	Max	28.3	27.0	86.8	78.9	156.8	107.5	167.0	96.0	126.0
	Average	9.6	8.2	16.1	19.8	37.8	31.2	59.9	22.7	29.9
	Sum	172.2	180.1	241.1	276.7	416.0	374.0	479.1	182.0	149.7
	Count	18.0	22.0	15.0	14.0	11.0	12.0	8.0	8.0	5.0
C3	Min	0.4	0.4	0.7	0.1	1.5	1.0	10.8	1.6	1.9
	Max	47.8	107.1	75.5	272.5	79.0	154.8	63.2	141.9	102.6
	Average	7.9	14.6	14.6	32.5	19.3	33.7	25.0	36.8	29.0
	Sum	213.3	365.7	320.6	747.4	521.5	674.1	99.8	368.0	347.6
	Count	27.0	25.0	22.0	23.0	27.0	20.0	4.0	10.0	12.0
C4	Min	0.8	0.0	1.3	1.7	0.7	0.5	15.2	2.8	9.4
	Max	24.8	29.8	12.8	342.0	197.7	255.9	26.4	62.6	56.4
	Average	9.2	9.8	6.0	90.2	68.1	77.5	20.6	22.7	23.0
	Sum	100.8	127.9	71.7	541.4	340.5	387.4	82.3	113.5	91.8
	Count	11.0	13.0	12.0	6.0	5.0	5.0	4.0	5.0	4.0
C5	Min	6.3	0.6	0.9	4.7	2.4	2.4	1.1	8.4	3.0
	Max	26.1	59.2	26.5	46.4	85.2	62.0	96.2	29.5	124.3
	Average	12.2	14.5	9.0	20.9	29.9	18.3	27.2	20.0	31.6
	Sum	97.7	216.9	90.2	146.4	179.1	146.3	163.4	80.0	157.9
	Count	8.0	15.0	10.0	7.0	6.0	8.0	6.0	4.0	5.0
C6	Min	0.8	0.1	2.0	1.8	1.6	1.6	1.0	1.5	3.6
	Max	19.2	48.2	51.2	167.9	173.4	156.2	86.1	89.6	165.2
	Average	5.5	10.6	10.7	41.0	40.6	45.5	32.6	24.4	68.7
	Sum	105.2	274.6	160.3	738.3	730.7	682.9	163.0	219.2	412.3
	Count	19.0	26.0	15.0	18.0	18.0	15.0	5.0	9.0	6.0
C7	Min	0.2	0.1	0.0	0.7	1.0	0.8	1.9	2.0	1.5
	Max	82.2	38.9	65.8	358.0	226.4	275.4	259.3	195.1	376.3
	Average	10.4	8.2	10.6	74.6	54.7	47.7	58.8	29.5	61.9

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Sum	396.3	448.9	435.6	1491.6	1639.9	1431.2	588.3	502.1	927.9
	Count	38.0	55.0	41.0	20.0	30.0	30.0	10.0	17.0	15.0
C8	Min	0.5	1.5	0.7	1.7	2.2	4.1	0.3	0.1	0.1
	Max	85.5	62.4	134.8	46.3	58.1	223.0	181.9	68.9	67.6
	Average	12.3	9.9	24.5	24.5	27.9	60.5	49.9	11.1	24.0
	Sum	209.6	177.5	220.4	293.4	417.8	604.5	349.5	178.3	120.0
	Count	17.0	18.0	9.0	12.0	15.0	10.0	7.0	16.0	5.0
C9	Min	0.2	0.4	2.3	0.4	3.1	2.3	6.2	1.7	1.9
	Max	102.7	45.6	58.9	428.3	351.0	575.9	132.5	212.8	345.7
	Average	12.5	8.9	18.3	60.4	62.7	66.5	32.9	39.4	58.5
	Sum	753.0	410.6	474.6	2173.7	1881.3	1995.2	493.4	906.7	876.9
	Count	60.0	46.0	26.0	36.0	30.0	30.0	15.0	23.0	15.0
C10	Min	0.4	1.9	0.9	0.9	1.7	2.4	5.6	3.6	18.3
	Max	294.3	241.2	171.7	241.2	281.1	163.9	232.9	115.9	116.4
	Average	36.5	33.0	27.6	49.1	58.3	33.1	54.4	29.7	76.1
	Sum	474.5	296.9	386.5	736.7	815.9	694.5	435.0	267.4	380.3
	Count	13.0	9.0	14.0	15.0	14.0	21.0	8.0	9.0	5.0
C11	Min	0.1	0.6	0.4	0.5	0.6	1.4	1.6	3.2	1.7
	Max	65.1	55.0	37.9	349.3	271.1	152.5	140.3	137.5	290.3
	Average	7.9	12.5	12.5	35.9	25.9	32.0	24.1	34.9	64.9
	Sum	291.9	350.0	237.2	1076.0	827.3	895.5	384.8	313.7	649.4
	Count	37.0	28.0	19.0	30.0	32.0	28.0	16.0	9.0	10.0
C12	Min	0.2	0.7	0.9	0.3	2.9	2.4	2.4	1.0	0.7
	Max	43.5	82.2	150.0	113.2	101.4	109.1	75.9	89.3	126.7
	Average	8.5	16.7	19.7	28.5	30.8	30.9	24.2	19.9	24.7
	Sum	264.3	300.0	374.8	597.9	646.9	617.8	266.7	258.1	346.0
	Count	31.0	18.0	19.0	21.0	21.0	20.0	11.0	13.0	14.0
C13	Min	0.2	0.7	1.3	0.3	1.0	1.0	6.1	0.1	3.0
	Max	87.6	77.2	32.2	376.6	197.6	155.3	90.7	74.5	98.6
	Average	12.8	13.6	10.3	60.4	34.6	34.0	30.9	19.1	27.8
	Sum	295.3	326.1	153.8	844.9	760.8	781.6	154.7	152.5	194.5
	Count	23.0	24.0	15.0	14.0	22.0	23.0	5.0	8.0	7.0
C14	Min	0.5	0.5	1.6	0.3	1.1	1.9	2.5	2.8	5.3
	Max	87.1	38.7	28.2	471.6	149.2	189.5	82.1	98.0	63.9
	Average	17.9	7.4	9.5	58.3	34.3	37.1	29.0	24.0	22.7
	Sum	554.6	376.6	218.7	1632.8	1133.0	1112.4	464.0	359.6	317.1
	Count	31.0	51.0	23.0	28.0	33.0	30.0	16.0	15.0	14.0
C15	Min	2.2	1.0	4.8	8.2	0.4	2.7	1.7	7.4	0.5
	Max	37.6	30.5	24.7	82.1	82.6	26.2	58.9	7.4	62.8
	Average	12.4	9.7	11.3	31.5	16.4	8.3	17.5	7.4	11.0
	Sum	74.5	87.2	90.7	189.2	196.3	57.9	87.5	7.4	121.5
	Count	6.0	9.0	8.0	6.0	12.0	7.0	5.0	1.0	11.0
C16	Min	0.8	0.3	0.9	0.0	0.8	0.7	6.3	1.7	1.0
	Max	84.1	74.1	29.0	61.8	68.9	71.3	62.0	81.1	84.9
	Average	10.9	8.7	7.4	15.0	14.3	16.0	18.1	18.8	21.3
	Sum	347.5	234.2	177.6	346.1	315.4	336.9	217.2	225.6	320.2

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Count	32.0	27.0	24.0	23.0	22.0	21.0	12.0	12.0	15.0
C17	Min	1.0	0.0	0.0	1.2	0.2	0.3	4.5	3.2	3.2
	Max	14.7	13.0	10.4	83.0	49.5	38.0	90.5	76.8	66.6
	Average	5.4	4.0	4.3	20.5	11.5	13.1	34.7	20.5	19.8
	Sum	27.2	36.4	25.8	225.5	173.0	221.9	173.3	122.8	119.0
	Count	5.0	9.0	6.0	11.0	15.0	17.0	5.0	6.0	6.0
C18	Min	0.5	0.2	0.4	0.6	0.8	1.2	10.8	11.8	8.1
	Max	15.4	29.8	30.9	205.1	75.1	38.5	10.8	12.4	18.4
	Average	7.7	8.2	12.5	69.1	12.9	13.3	10.8	12.1	12.7
	Sum	54.0	73.7	87.3	207.2	102.8	119.5	10.8	24.2	38.2
	Count	7.0	9.0	7.0	3.0	8.0	9.0	1.0	2.0	3.0
C19	Min	0.0	0.5	0.9	1.2	0.9	0.5	0.7	1.2	2.3
	Max	85.1	143.2	157.7	57.0	12.1	10.7	51.6	20.4	11.4
	Average	11.7	14.8	16.9	23.2	5.1	3.9	11.1	5.0	6.8
	Sum	408.9	489.7	573.5	139.5	56.1	78.8	165.9	55.2	61.4
	Count	35.0	33.0	34.0	6.0	11.0	20.0	15.0	11.0	9.0
C20	Min	0.3	1.6	0.8	0.2	1.6	1.3	1.4	1.1	1.4
	Max	28.8	91.1	99.8	26.7	20.4	30.3	18.3	37.4	54.6
	Average	6.9	12.9	11.4	6.3	7.3	5.8	6.1	11.1	18.0
	Sum	137.6	206.4	193.5	43.9	58.6	69.1	42.4	77.8	89.8
	Count	20.0	16.0	17.0	7.0	8.0	12.0	7.0	7.0	5.0
C21	Min	0.6	0.7	0.1	1.5	1.5	1.9	2.4	2.4	1.5
	Max	15.6	34.3	64.9	12.6	10.8	16.0	29.0	12.2	28.5
	Average	4.9	7.7	6.4	5.2	4.6	5.9	8.2	4.9	8.9
	Sum	113.4	246.8	199.7	57.3	36.8	47.5	73.4	19.5	98.2
	Count	23.0	32.0	31.0	11.0	8.0	8.0	9.0	4.0	11.0
D1	Min	1.6	0.9	0.2	3.3	1.7	0.7	2.9	4.8	3.9
	Max	17.6	33.6	21.6	32.4	19.7	23.1	13.0	23.3	17.3
	Average	5.0	5.1	5.0	14.7	6.4	5.5	6.6	13.4	11.1
	Sum	69.7	97.7	44.9	88.1	44.5	43.8	39.8	80.5	66.3
	Count	14.0	19.0	9.0	6.0	7.0	8.0	6.0	6.0	6.0
D2	Min	0.5	1.1	1.2	0.2	1.1	0.9	49.5		1.7
	Max	72.7	69.9	94.0	12.8	18.3	13.0	49.5		78.1
	Average	11.4	12.9	13.0	4.5	9.9	6.8	49.5		22.9
	Sum	182.2	321.8	234.5	31.7	49.7	27.3	49.5		91.7
	Count	16.0	25.0	18.0	7.0	5.0	4.0	1.0		4.0
D3	Min	0.8	0.2	1.3	0.3	4.1	1.1	1.2	4.2	0.0
	Max	145.5	131.6	99.4	40.2	38.1	156.2	68.0	53.8	52.8
	Average	15.7	27.1	20.9	19.8	14.2	28.0	21.9	21.0	18.0
	Sum	345.1	542.2	418.0	98.9	142.5	196.1	175.3	105.2	108.2
	Count	22.0	20.0	20.0	5.0	10.0	7.0	8.0	5.0	6.0
D4	Min	0.3	0.2	0.2	1.8	2.2	2.9	2.7	7.0	2.9
	Max	100.4	130.6	147.3	57.4	108.1	39.9	54.8	53.5	86.9
	Average	16.4	17.2	22.4	28.6	25.5	17.4	18.9	24.2	20.2
	Sum	556.0	688.0	671.9	371.5	331.2	191.2	151.5	145.4	222.0
	Count	34.0	40.0	30.0	13.0	13.0	11.0	8.0	6.0	11.0

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
D5	Min	0.6	0.3	0.2	0.4	3.7	1.1	3.4	0.5	6.5
	Max	174.6	163.1	121.9	127.9	121.5	182.7	61.9	175.9	181.9
	Average	22.6	18.6	18.9	39.0	31.6	39.5	19.4	40.9	42.6
	Sum	1490.2	1298.6	1249.1	819.3	662.6	948.2	330.4	654.9	511.5
	Count	66.0	70.0	66.0	21.0	21.0	24.0	17.0	16.0	12.0
D6	Min	0.5	0.3	0.8	0.4	4.5	1.6	2.7	6.1	0.8
	Max	313.7	161.4	77.1	138.3	59.0	53.0	142.4	47.9	79.5
	Average	27.9	15.5	13.9	24.6	22.8	26.5	29.2	13.3	13.9
	Sum	669.5	603.5	403.8	393.2	250.5	345.1	233.5	106.4	139.3
	Count	24.0	39.0	29.0	16.0	11.0	13.0	8.0	8.0	10.0
D7	Min	0.2	0.5	0.9	0.1	0.7	2.7	2.7	2.0	1.4
	Max	107.9	88.8	35.3	153.3	159.7	298.9	53.7	26.1	48.2
	Average	13.4	13.5	8.2	44.6	35.5	66.1	15.1	11.3	16.8
	Sum	617.6	619.7	318.1	757.7	815.5	1123.3	136.3	67.6	134.1
	Count	46.0	46.0	39.0	17.0	23.0	17.0	9.0	6.0	8.0
D8	Min	0.2	1.2	1.3	3.4	2.8	3.0	2.7	8.5	2.1
	Max	186.4	197.8	271.2	110.6	400.1	301.4	100.9	103.7	106.7
	Average	31.7	23.8	43.9	41.4	70.6	51.6	26.9	53.9	29.1
	Sum	1491.5	1240.2	1184.8	994.8	1483.3	1444.0	430.9	269.3	203.4
	Count	47.0	52.0	27.0	24.0	21.0	28.0	16.0	5.0	7.0
D9	Min	0.9	1.9	1.8	4.6	3.5	2.9	5.3	9.5	5.2
	Max	97.0	44.4	29.9	144.7	168.6	521.6	39.3	68.7	5.2
	Average	22.9	12.4	10.5	52.2	40.5	52.1	15.5	27.0	5.2
	Sum	480.6	286.1	146.3	417.5	526.9	781.5	77.3	108.0	5.2
	Count	21.0	23.0	14.0	8.0	13.0	15.0	5.0	4.0	1.0
D10	Min	0.8	0.3	0.1	0.3	1.3	1.6	0.0	7.0	5.6
	Max	148.9	156.3	88.8	213.5	693.9	870.0	80.0	32.7	42.8
	Average	27.8	13.6	16.9	48.9	59.9	53.4	20.8	17.3	24.7
	Sum	1251.2	680.8	796.1	1760.9	1797.3	2083.2	228.3	138.1	172.7
	Count	45.0	50.0	47.0	36.0	30.0	39.0	11.0	8.0	7.0
D11	Min	0.5	0.1	1.0	0.5	1.4	0.3	0.8	1.7	6.7
	Max	256.8	208.6	230.0	415.7	493.5	391.8	232.9	18.4	128.6
	Average	29.7	22.2	17.9	49.9	88.4	65.9	53.7	8.6	46.2
	Sum	1037.8	756.3	608.7	1597.1	2210.6	2108.3	483.5	25.8	277.2
	Count	35.0	34.0	34.0	32.0	25.0	32.0	9.0	3.0	6.0
D12	Min	0.5	0.2	0.8	3.1	0.6	0.2	4.0	4.4	4.2
	Max	247.0	140.2	87.4	235.5	658.4	804.3	78.4	137.8	189.5
	Average	21.5	14.0	11.3	64.5	81.6	71.8	27.1	71.1	33.8
	Sum	1611.4	870.4	473.5	2128.4	2856.4	3517.4	379.5	284.3	337.7
	Count	75.0	62.0	42.0	33.0	35.0	49.0	14.0	4.0	10.0
D13	Min	0.5	0.2	0.7	2.2	0.3	2.0	3.7	5.3	8.8
	Max	175.6	31.2	43.2	110.3	279.9	346.3	51.5	31.8	19.4
	Average	26.7	6.6	11.6	32.0	31.7	41.1	22.9	16.8	14.1
	Sum	987.8	277.2	372.7	641.0	1014.0	1273.4	114.5	67.4	28.2
	Count	37.0	42.0	32.0	20.0	32.0	31.0	5.0	4.0	2.0
D14	Min	0.8	0.2	0.8	2.6	0.0	0.7	6.5	3.7	5.5

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Max	500.7	159.2	118.8	246.1	421.8	478.2	28.9	8.4	13.3
	Average	58.8	28.6	13.9	55.5	70.4	74.5	14.4	6.2	9.6
	Sum	2000.5	885.6	556.3	1110.9	1479.0	1863.1	129.7	18.7	38.4
	Count	34.0	31.0	40.0	20.0	21.0	25.0	9.0	3.0	4.0
D15	Min	0.2		1.8	7.7		1.8	13.7		3.6
	Max	120.5		39.0	121.8		199.0	35.0		16.2
	Average	35.5		12.0	46.0		39.9	22.7		9.9
	Sum	568.0		228.1	322.1		678.8	90.8		19.8
	Count	16.0		19.0	7.0		17.0	4.0		2.0
D16	Min	0.5		1.7	0.6		2.5	3.3		5.3
	Max	379.8		185.8	930.0		891.6	31.5		60.8
	Average	44.8		26.0	141.0		95.7	13.2		20.1
	Sum	1971.6		988.8	2537.5		2965.9	66.1		201.3
	Count	44.0		38.0	18.0		31.0	5.0		10.0

Appendix D. Summary statistics of Perimeter Area Ratios (PARA)

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
A1	Min	0.024	0.029	0.034	0.009	0.006	0.008	0.018	0.017	0.013
	Max	0.077	0.175	0.104	0.085	0.126	0.121	0.018	0.024	0.050
	Average	0.048	0.074	0.064	0.033	0.050	0.048	0.018	0.021	0.029
A2	Min	0.039	0.025	0.021	0.013	0.012	0.013	0.026	0.019	0.010
	Max	0.141	0.198	0.181	0.133	0.128	0.111	0.062	0.066	0.069
	Average	0.066	0.078	0.082	0.047	0.051	0.043	0.041	0.039	0.038
A3	Min	0.014	0.022	0.012	0.013	0.009	0.008		0.019	0.010
	Max	0.083	0.325	0.074	0.118	0.216	0.093		0.066	0.033
	Average	0.033	0.087	0.040	0.046	0.050	0.034		0.042	0.023
A4	Min	0.043	0.027	0.037	0.010	0.016	0.016	0.024	0.026	0.021
	Max	0.104	0.245	0.060	0.081	0.096	0.071	0.048	0.032	0.046
	Average	0.064	0.101	0.049	0.035	0.040	0.033	0.033	0.030	0.034
A5	Min	0.079	0.069	0.053	0.025	0.017	0.027	0.024	0.026	0.021
	Max	0.147	0.228	0.196	0.106	0.087	0.092	0.048	0.109	0.021
	Average	0.113	0.123	0.115	0.058	0.055	0.056	0.035	0.060	0.021
A6	Min	0.023	0.049	0.061	0.016	0.044	0.038	0.016	0.016	0.018
	Max	0.096	0.270	0.061	0.097	0.154	0.154	0.020	0.023	0.081
	Average	0.060	0.151	0.061	0.062	0.085	0.087	0.018	0.019	0.050
A7	Min	0.017	0.019	0.030	0.010	0.011	0.010	0.011	0.017	0.017
	Max	0.103	0.166	0.139	0.100	0.190	0.125	0.060	0.056	0.136
	Average	0.049	0.068	0.070	0.043	0.064	0.041	0.037	0.029	0.051
A8	Min	0.016	0.016	0.019	0.011	0.020	0.013	0.025	0.014	0.017
	Max	0.127	0.142	0.106	0.073	0.088	0.058	0.028	0.053	0.017
	Average	0.056	0.056	0.045	0.034	0.040	0.031	0.026	0.030	0.017
A9	Min	0.022	0.021	0.016	0.012	0.010	0.010	0.010	0.017	0.016
	Max	0.089	0.143	0.106	0.042	0.064	0.061	0.035	0.080	0.043
	Average	0.052	0.069	0.054	0.026	0.032	0.032	0.022	0.039	0.025
A10	Min	0.018	0.048	0.025	0.009	0.009	0.009	0.040	0.021	0.017
	Max	0.106	0.229	0.096	0.075	0.112	0.055	0.080	0.021	0.051
	Average	0.042	0.093	0.063	0.030	0.038	0.033	0.059	0.021	0.033
A11	Min	0.017	0.014	0.037	0.005	0.016	0.010	0.018	0.012	0.020
	Max	0.059	0.204	0.089	0.103	0.065	0.074	0.058	0.047	0.039
	Average	0.035	0.072	0.059	0.038	0.036	0.041	0.034	0.031	0.032
A12	Min	0.020	0.031	0.023	0.012	0.014	0.013	0.020	0.026	0.027
	Max	0.154	0.181	0.114	0.053	0.093	0.088	0.046	0.038	0.049
	Average	0.055	0.067	0.062	0.032	0.039	0.045	0.031	0.033	0.036
A13	Min	0.024	0.029	0.019	0.009	0.011	0.010	0.018	0.016	0.034
	Max	0.075	0.062	0.064	0.054	0.045	0.036	0.048	0.028	0.034
	Average	0.039	0.047	0.039	0.027	0.026	0.022	0.036	0.022	0.034
A14	Min	0.031	0.024	0.018	0.009	0.010	0.009	0.013	0.009	0.015
	Max	0.047	0.163	0.072	0.083	0.119	0.125	0.087	0.109	0.088
	Average	0.039	0.091	0.051	0.031	0.040	0.044	0.045	0.045	0.037
A15	Min	0.013	0.030	0.017	0.011	0.007	0.006	0.028	0.010	0.009
	Max	0.079	0.142	0.087	0.066	0.074	0.076	0.047	0.026	0.016
	Average	0.048	0.061	0.048	0.035	0.038	0.035	0.037	0.017	0.013

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
A16	Min	0.009	0.010	0.010	0.010	0.010	0.010	0.012	0.009	0.012
	Max	0.108	0.143	0.116	0.078	0.144	0.089	0.063	0.078	0.070
	Average	0.048	0.054	0.052	0.030	0.037	0.033	0.035	0.046	0.027
A17	Min	0.019	0.016	0.016	0.008	0.009	0.007	0.016	0.012	0.012
	Max	0.076	0.088	0.102	0.067	0.089	0.108	0.056	0.077	0.049
	Average	0.047	0.043	0.048	0.030	0.037	0.039	0.028	0.033	0.024
A18	Min	0.014	0.019	0.016	0.009	0.006	0.007	0.010	0.012	0.012
	Max	0.069	0.128	0.072	0.051	0.115	0.075	0.050	0.027	0.033
	Average	0.033	0.050	0.034	0.023	0.038	0.035	0.029	0.021	0.023
B1	Min	0.015	0.009	0.013	0.008	0.008	0.007	0.007	0.013	0.009
	Max	0.098	0.128	0.092	0.072	0.089	0.129	0.056	0.095	0.110
	Average	0.039	0.050	0.040	0.022	0.030	0.032	0.024	0.029	0.033
B2	Min	0.012	0.019	0.014	0.015	0.009	0.008	0.007	0.019	0.016
	Max	0.085	0.077	0.061	0.041	0.075	0.058	0.038	0.032	0.026
	Average	0.041	0.045	0.043	0.025	0.035	0.031	0.021	0.024	0.022
B3	Min	0.014	0.013	0.010	0.007	0.008	0.008	0.014	0.011	0.014
	Max	0.028	0.101	0.096	0.061	0.070	0.091	0.085	0.048	0.063
	Average	0.021	0.053	0.048	0.028	0.034	0.029	0.029	0.032	0.034
B4	Min	0.019	0.027	0.018	0.006	0.008	0.014	0.014	0.018	0.008
	Max	0.032	0.064	0.063	0.051	0.050	0.098	0.033	0.036	0.086
	Average	0.024	0.039	0.037	0.024	0.023	0.040	0.020	0.027	0.041
B5	Min	0.015	0.011	0.019	0.006	0.008	0.007	0.013	0.013	0.008
	Max	0.065	0.140	0.084	0.087	0.086	0.114	0.045	0.066	0.097
	Average	0.030	0.048	0.039	0.023	0.031	0.034	0.026	0.028	0.031
B6	Min	0.015	0.023	0.013	0.007	0.011	0.012	0.019	0.007	0.020
	Max	0.100	0.079	0.081	0.102	0.091	0.137	0.073	0.097	0.096
	Average	0.049	0.045	0.041	0.026	0.031	0.039	0.037	0.031	0.045
B7	Min	0.018	0.011	0.013	0.011	0.010	0.012	0.009	0.011	0.010
	Max	0.146	0.148	0.108	0.124	0.117	0.105	0.082	0.106	0.069
	Average	0.057	0.047	0.047	0.047	0.038	0.034	0.040	0.047	0.037
B8	Min	0.014	0.016	0.008	0.011	0.008	0.008	0.009	0.009	0.009
	Max	0.103	0.099	0.087	0.086	0.088	0.091	0.083	0.059	0.048
	Average	0.043	0.048	0.036	0.038	0.032	0.024	0.033	0.028	0.028
B9	Min	0.018	0.016	0.016	0.008	0.012	0.007	0.011	0.014	0.016
	Max	0.126	0.166	0.064	0.121	0.072	0.083	0.094	0.048	0.058
	Average	0.051	0.052	0.037	0.039	0.027	0.027	0.039	0.031	0.031
B10	Min	0.010	0.011	0.008	0.014	0.018	0.009	0.007	0.010	0.010
	Max	0.098	0.141	0.101	0.099	0.063	0.074	0.094	0.049	0.053
	Average	0.046	0.053	0.040	0.032	0.031	0.028	0.041	0.026	0.025
B11	Min	0.016	0.016	0.012	0.009	0.008	0.007	0.014	0.018	0.016
	Max	0.126	0.149	0.129	0.074	0.076	0.079	0.084	0.035	0.030
	Average	0.060	0.050	0.033	0.032	0.032	0.028	0.043	0.027	0.022
B12	Min	0.011	0.013	0.013	0.009	0.008	0.011	0.012	0.012	0.007
	Max	0.098	0.105	0.105	0.044	0.090	0.095	0.042	0.070	0.083
	Average	0.057	0.052	0.039	0.029	0.036	0.041	0.028	0.035	0.027
C1	Min	0.018	0.010	0.009	0.006	0.008	0.008	0.012	0.012	0.007

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Max	0.099	0.083	0.073	0.097	0.096	0.116	0.057	0.054	0.033
	Average	0.049	0.039	0.040	0.028	0.033	0.033	0.030	0.024	0.017
C2	Min	0.012	0.016	0.009	0.012	0.008	0.008	0.009	0.011	0.006
	Max	0.113	0.133	0.068	0.050	0.068	0.067	0.030	0.054	0.048
	Average	0.045	0.048	0.039	0.027	0.029	0.023	0.016	0.028	0.028
C3	Min	0.017	0.010	0.012	0.006	0.010	0.007	0.014	0.010	0.007
	Max	0.136	0.103	0.111	0.114	0.058	0.070	0.022	0.052	0.040
	Average	0.058	0.046	0.043	0.029	0.028	0.024	0.019	0.029	0.023
C4	Min	0.021	0.012	0.021	0.006	0.008	0.008	0.008	0.010	0.008
	Max	0.109	0.082	0.119	0.025	0.099	0.126	0.027	0.019	0.038
	Average	0.047	0.040	0.052	0.014	0.033	0.033	0.018	0.016	0.024
C5	Min	0.021	0.012	0.023	0.013	0.009	0.013	0.008	0.015	0.008
	Max	0.055	0.081	0.093	0.039	0.112	0.048	0.070	0.031	0.077
	Average	0.034	0.038	0.056	0.026	0.037	0.027	0.027	0.021	0.038
C6	Min	0.019	0.012	0.012	0.008	0.006	0.007	0.006	0.008	0.004
	Max	0.101	0.103	0.080	0.065	0.068	0.064	0.095	0.060	0.052
	Average	0.051	0.041	0.043	0.029	0.026	0.028	0.032	0.029	0.019
C7	Min	0.012	0.014	0.012	0.005	0.005	0.006	0.006	0.008	0.004
	Max	0.170	0.108	0.082	0.078	0.100	0.113	0.057	0.073	0.069
	Average	0.052	0.042	0.039	0.018	0.023	0.025	0.019	0.024	0.021
C8	Min	0.013	0.023	0.015	0.011	0.011	0.010	0.009	0.014	0.018
	Max	0.119	0.082	0.112	0.057	0.058	0.042	0.034	0.100	0.037
	Average	0.049	0.046	0.046	0.024	0.026	0.023	0.019	0.041	0.025
C9	Min	0.006	0.014	0.010	0.005	0.003	0.005	0.010	0.006	0.007
	Max	0.156	0.136	0.077	0.154	0.059	0.095	0.033	0.061	0.041
	Average	0.053	0.045	0.030	0.024	0.020	0.024	0.019	0.028	0.022
C10	Min	0.013	0.014	0.009	0.007	0.006	0.007	0.010	0.009	0.007
	Max	0.128	0.068	0.098	0.077	0.060	0.061	0.031	0.038	0.022
	Average	0.041	0.034	0.048	0.029	0.030	0.028	0.020	0.022	0.011
C11	Min	0.014	0.014	0.018	0.004	0.008	0.009	0.010	0.007	0.004
	Max	0.211	0.114	0.124	0.094	0.100	0.079	0.059	0.045	0.066
	Average	0.065	0.041	0.042	0.030	0.032	0.027	0.028	0.021	0.024
C12	Min	0.017	0.016	0.012	0.012	0.010	0.007	0.012	0.014	0.008
	Max	0.134	0.087	0.096	0.138	0.063	0.087	0.056	0.074	0.112
	Average	0.046	0.037	0.042	0.034	0.026	0.026	0.025	0.029	0.037
C13	Min	0.012	0.018	0.018	0.007	0.010	0.009	0.010	0.010	0.007
	Max	0.136	0.086	0.068	0.089	0.096	0.097	0.033	0.025	0.041
	Average	0.046	0.041	0.039	0.027	0.028	0.035	0.022	0.018	0.022
C14	Min	0.011	0.017	0.019	0.007	0.008	0.005	0.010	0.010	0.012
	Max	0.073	0.121	0.073	0.170	0.062	0.081	0.050	0.046	0.035
	Average	0.035	0.054	0.039	0.031	0.028	0.030	0.022	0.027	0.023
C15	Min	0.024	0.028	0.023	0.016	0.016	0.019	0.016	0.027	0.019
	Max	0.056	0.091	0.064	0.030	0.143	0.068	0.063	0.027	0.116
	Average	0.038	0.057	0.038	0.022	0.041	0.040	0.039	0.027	0.047
C16	Min	0.012	0.017	0.020	0.011	0.012	0.012	0.015	0.012	0.010
	Max	0.116	0.102	0.091	0.055	0.077	0.089	0.036	0.072	0.070

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
	Average	0.041	0.046	0.048	0.030	0.031	0.034	0.024	0.035	0.031
C17	Min	0.025	0.026	0.024	0.013	0.017	0.012	0.019	0.015	0.015
	Max	0.077	0.067	0.090	0.072	0.055	0.095	0.037	0.052	0.054
	Average	0.048	0.046	0.050	0.033	0.034	0.039	0.025	0.034	0.032
C18	Min	0.020	0.020	0.016	0.017	0.018	0.018	0.024	0.022	0.018
	Max	0.101	0.065	0.058	0.072	0.077	0.112	0.024	0.022	0.034
	Average	0.045	0.040	0.035	0.036	0.042	0.041	0.024	0.022	0.027
C19	Min	0.020	0.016	0.016	0.019	0.035	0.021	0.016	0.036	0.028
	Max	0.124	0.136	0.102	0.066	0.094	0.112	0.066	0.090	0.105
	Average	0.053	0.058	0.049	0.034	0.055	0.058	0.036	0.051	0.047
C20	Min	0.019	0.021	0.020	0.026	0.022	0.023	0.018	0.026	0.025
	Max	0.159	0.128	0.112	0.072	0.078	0.087	0.084	0.083	0.064
	Average	0.058	0.049	0.056	0.049	0.050	0.055	0.043	0.045	0.036
C21	Min	0.019	0.017	0.018	0.024	0.028	0.028	0.013	0.028	0.017
	Max	0.107	0.101	0.243	0.076	0.088	0.071	0.061	0.073	0.078
	Average	0.060	0.049	0.067	0.049	0.049	0.046	0.038	0.049	0.044
D1	Min	0.020	0.020	0.020	0.015	0.031	0.033	0.032	0.021	0.026
	Max	0.112	0.113	0.142	0.057	0.082	0.093	0.054	0.078	0.069
	Average	0.066	0.060	0.058	0.038	0.051	0.059	0.044	0.041	0.041
D2	Min	0.023	0.015	0.022	0.031	0.034	0.030	0.014		0.020
	Max	0.148	0.096	0.092	0.091	0.068	0.085	0.014		0.044
	Average	0.055	0.045	0.053	0.058	0.044	0.052	0.014		0.037
D3	Min	0.014	0.014	0.010	0.014	0.015	0.010	0.013	0.017	0.012
	Max	0.098	0.100	0.128	0.048	0.044	0.062	0.064	0.054	0.042
	Average	0.047	0.036	0.041	0.026	0.029	0.040	0.029	0.033	0.026
D4	Min	0.017	0.010	0.008	0.010	0.009	0.012	0.014	0.018	0.012
	Max	0.142	0.166	0.082	0.066	0.064	0.050	0.046	0.032	0.047
	Average	0.051	0.049	0.039	0.028	0.029	0.031	0.026	0.025	0.028
D5	Min	0.010	0.010	0.009	0.009	0.006	0.006	0.015	0.007	0.007
	Max	0.101	0.127	0.184	0.035	0.039	0.099	0.042	0.057	0.043
	Average	0.036	0.039	0.047	0.018	0.020	0.032	0.027	0.023	0.025
D6	Min	0.011	0.014	0.014	0.013	0.012	0.010	0.008	0.013	0.011
	Max	0.135	0.144	0.118	0.112	0.045	0.051	0.052	0.042	0.042
	Average	0.039	0.057	0.041	0.030	0.023	0.026	0.026	0.029	0.031
D7	Min	0.010	0.013	0.014	0.012	0.007	0.006	0.011	0.015	0.012
	Max	0.114	0.119	0.085	0.073	0.106	0.052	0.071	0.042	0.043
	Average	0.040	0.041	0.042	0.028	0.033	0.021	0.031	0.030	0.028
D8	Min	0.010	0.010	0.007	0.010	0.007	0.009	0.009	0.013	0.013
	Max	0.152	0.087	0.087	0.058	0.038	0.063	0.041	0.027	0.075
	Average	0.035	0.030	0.027	0.021	0.019	0.023	0.023	0.020	0.027
D9	Min	0.010	0.016	0.015	0.011	0.011	0.007	0.016	0.013	0.022
	Max	0.091	0.062	0.061	0.047	0.041	0.047	0.032	0.026	0.022
	Average	0.034	0.033	0.038	0.024	0.024	0.024	0.027	0.020	0.022
D10	Min	0.007	0.009	0.011	0.005	0.007	0.007	0.007	0.019	0.020
	Max	0.101	0.154	0.208	0.157	0.059	0.067	1.405	0.030	0.046
	Average	0.028	0.044	0.045	0.024	0.023	0.026	0.158	0.025	0.031

Reach	Statistic	Shrub			Closed Timber			Open Timber		
		1950	1976	2001	1950	1976	2001	1950	1976	2001
D11	Min	0.009	0.013	0.011	0.004	0.004	0.005	0.006	0.030	0.007
	Max	0.139	0.174	0.084	0.201	0.061	0.105	0.088	0.058	0.027
	Average	0.042	0.045	0.038	0.032	0.023	0.025	0.026	0.041	0.019
D12	Min	0.009	0.008	0.011	0.005	0.004	0.004	0.010	0.009	0.013
	Max	0.120	0.179	0.098	0.029	0.102	0.142	0.040	0.069	0.077
	Average	0.038	0.053	0.051	0.015	0.030	0.033	0.022	0.026	0.033
D13	Min	0.007	0.016	0.013	0.010	0.009	0.007	0.012	0.013	0.028
	Max	0.111	0.209	0.096	0.051	0.166	0.052	0.036	0.037	0.031
	Average	0.032	0.065	0.042	0.024	0.038	0.027	0.024	0.026	0.030
D14	Min	0.008	0.008	0.012	0.009	0.007	0.005	0.014	0.036	0.022
	Max	0.097	0.125	0.102	0.044	0.067	0.079	0.035	0.043	0.036
	Average	0.032	0.040	0.045	0.022	0.026	0.029	0.023	0.038	0.028
D15	Min	0.013		0.022	0.013		0.008	0.016		0.031
	Max	0.131		0.079	0.024		0.073	0.033		0.037
	Average	0.042		0.038	0.018		0.031	0.023		0.034
D16	Min	0.006		0.006	0.008		0.004	0.022		0.012
	Max	0.132		0.075	0.159		0.072	0.052		0.053
	Average	0.039		0.033	0.031		0.028	0.034		0.030

Appendix E. Summary statistics of Nearest Neighbor Distance (NND)

			Shrub			Closed Timber			Open Timber		
Reach	Bank	Statistic	1950	1976	2001	1950	1976	2001	1950	1976	2001
A1	LEFT	Min	92.1	37.2	169.9	25.0	15.3	9.8		87.9	864.1
		Max	1004.7	284.6	1168.0	638.0	901.1	81.0		284.2	864.1
		Average	452.7	125.9	495.6	218.4	211.4	25.7		153.3	864.1
	RIGHT	Min	1534.3		24.3	575.6	11.6	415.3	3618.4		4116.9
		Max	2134.1		119.2	2201.4	565.4	415.3	3618.4		4116.9
		Average	1834.2		56.0	1388.5	196.2	415.3	3618.4		4116.9
A2	LEFT	Min	26.5	38.5	16.9	0.0	10.3	23.7	218.3	1534.1	324.4
		Max	549.4	490.6	380.7	1168.8	261.3	1133.7	975.5	4398.1	911.1
		Average	251.9	136.9	99.4	194.4	65.0	153.4	470.7	2488.8	617.7
	RIGHT	Min	12.0	53.4	12.2	14.4	10.5	18.4	449.0	911.6	28.9
		Max	616.5	1649.6	1190.4	478.1	454.6	415.3	455.8	2148.1	2179.8
		Average	157.9	640.7	381.5	121.1	66.2	112.1	451.3	1529.8	618.1
A3	LEFT	Min	1534.0	7.2	40.6	12.3	16.1	35.7			
		Max	1534.0	650.5	281.3	714.5	132.8	808.7			
		Average	1534.0	209.8	103.6	128.9	81.2	201.0			
	RIGHT	Min	54.7	6.2	456.8	14.4	4.8	21.4		2148.1	28.9
		Max	802.7	1194.3	1496.0	93.4	133.5	247.8		2722.0	325.8
		Average	353.8	234.4	822.9	48.4	24.8	93.6		2435.0	127.9
A4	LEFT	Min	900.0	29.9	3960.7	12.4	9.3	106.4	1676.9	3164.3	2655.4
		Max	900.0	29.9	3960.7	660.9	144.6	451.1	2136.5	3164.3	2655.4
		Average	900.0	29.9	3960.7	162.5	81.3	244.9	1906.7	3164.3	2655.4
	RIGHT	Min	98.3	8.0	21.0	27.5	18.9	13.9	472.2	4839.8	4836.6
		Max	556.4	339.4	781.0	466.3	97.5	173.4	649.1	4839.8	4836.6
		Average	245.3	45.0	179.6	101.1	43.1	54.9	560.7	4839.8	4836.6
A5	LEFT	Min	1998.7	408.6	456.1	56.0	65.7	113.2	1676.9	396.3	
		Max	1998.7	2970.0	456.1	716.1	1140.9	1021.8	1676.9	396.3	
		Average	1998.7	1262.4	456.1	421.0	354.2	383.5	1676.9	396.3	
	RIGHT	Min	2058.7	47.6	132.9	11.6	6.8	13.9	472.2	4839.8	4836.6
		Max	2058.7	952.5	132.9	649.5	96.6	211.0	649.1	4839.8	4836.6
		Average	2058.7	266.3	132.9	168.1	43.3	82.4	531.2	4839.8	4836.6
A6	LEFT	Min	106.1	2807.2		23.9	16.3				28.3
		Max	704.6	2807.2		23.9	1614.3				28.3
		Average	405.3	2807.2		23.9	549.0				28.3
	RIGHT	Min	53.6	80.7	919.4	609.0	19.0	50.7	578.4	533.1	529.0
		Max	618.7	1546.8	919.4	649.5	1025.1	211.0	578.4	533.1	529.0
		Average	217.9	358.0	919.4	622.5	237.8	93.3	578.4	533.1	529.0
A7	LEFT	Min	106.1	17.2	165.3	33.3	10.9	27.5	1781.9	1642.4	28.3
		Max	1393.9	1631.2	1080.7	208.0	1113.1	1202.1	3807.9	5151.8	3368.7
		Average	454.7	642.0	535.3	97.6	138.4	303.0	2794.9	3397.1	1354.5
	RIGHT	Min	11.9	45.1	50.8	29.7	7.2	21.3	900.1	199.1	1233.0
		Max	2918.5	1854.0	919.4	1557.9	998.5	1365.2	4534.7	4945.7	2693.7
		Average	557.5	627.4	219.5	457.3	75.6	205.7	2111.6	1781.3	2227.3
A8	LEFT	Min	13.5	240.8	38.1	66.5	20.2	7.1	1452.3	12.2	
		Max	1171.2	1081.1	1316.3	591.6	575.8	987.8	3677.4	1011.5	
		Average	227.6	461.8	352.1	127.5	100.3	249.0	2564.8	271.0	

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
	RIGHT	Min	44.2	13.6	20.7	33.6	66.5	117.6		326.8	6027.1
		Max	805.2	1134.1	1111.5	1213.5	831.0	785.8		815.2	6027.1
		Average	251.9	281.0	227.8	320.0	281.6	253.0		489.6	6027.1
A9	LEFT	Min	20.6	6.0	11.8	38.5	22.8	28.7	1452.3	58.2	124.8
		Max	1421.3	577.4	441.6	1224.4	461.0	129.5	2932.1	158.1	124.8
		Average	720.9	132.2	128.0	291.7	102.3	73.0	2192.2	108.1	124.8
	RIGHT	Min	161.4	97.5	16.8	62.3	32.0	46.5	62.7	2408.7	2339.4
		Max	579.0	331.4	1119.3	1213.5	1322.5	841.8	1301.5	2408.7	2339.4
		Average	331.8	190.3	350.0	441.6	892.3	311.6	583.3	2408.7	2339.4
A10	LEFT	Min	284.2	171.8	696.0	67.5	70.9	1741.7			1051.7
		Max	533.4	171.8	1122.1	1368.0	463.6	2839.7			4192.4
		Average	367.2	171.8	838.0	465.8	267.3	2290.7			2622.1
	RIGHT	Min	909.0	490.9	325.4	12.4	17.9	23.9	1468.8	3822.7	68.7
		Max	2116.0	2334.4	2323.3	248.7	104.9	836.3	1858.7	3822.7	1598.4
		Average	1311.3	924.2	991.4	60.9	34.7	321.4	1598.7	3822.7	722.6
A11	LEFT	Min	44.3	15.9	52.2	34.7	16.3	6.5	396.8	36.3	66.7
		Max	1059.5	413.0	1025.8	513.1	1381.7	1166.4	1850.4	429.2	1924.3
		Average	278.1	148.6	407.9	182.3	279.3	171.5	701.0	136.9	995.5
	RIGHT	Min	2187.3	16.9	33.2	18.2	205.3	23.9	450.2	763.2	
		Max	5680.9	534.8	1625.5	398.3	2232.7	835.6	804.9	763.2	
		Average	3934.1	177.9	416.0	87.9	991.7	320.4	568.4	763.2	
A12	LEFT	Min	19.6	23.4	3240.8	17.7	12.5	28.5	753.2		167.3
		Max	601.1	798.7	3240.8	1241.2	490.9	508.4	3253.4		508.8
		Average	278.1	162.3	3240.8	256.9	88.4	159.8	1497.5		281.1
	RIGHT	Min	10.6	21.3	24.4	13.7	18.9	14.9	2422.8	157.0	6536.5
		Max	1647.3	548.1	1013.4	1530.7	619.0	1446.9	2422.8	3171.3	6536.5
		Average	451.8	121.5	339.2	566.5	259.6	192.0	2422.8	1161.8	6536.5
A13	LEFT	Min	552.0	1932.3	674.1	23.7	52.5	42.8	3917.7	9.4	3658.7
		Max	3183.8	2476.8	2367.9	77.2	64.0	412.3	3917.7	9.4	3658.7
		Average	1867.9	2204.5	1238.7	49.1	58.2	203.6	3917.7	9.4	3658.7
	RIGHT	Min	556.3	1010.9	1125.1	13.7	18.9	4.5	2392.3		
		Max	1505.4	1265.6	1279.1	76.1	63.0	14.9	2422.8		
		Average	1163.8	1138.3	1202.1	34.7	32.8	8.3	2407.6		
A14	LEFT	Min	1882.4	2778.5	23.5	17.9	16.6	16.2	118.8	1278.3	523.9
		Max	3183.8	4977.6	259.6	1046.3	1048.7	559.6	2803.9	1810.9	3658.7
		Average	2533.1	3878.1	123.3	142.4	120.5	207.4	770.9	1580.2	1535.4
	RIGHT	Min		28.4	98.0	13.6	9.6	8.0	271.9	2209.1	454.5
		Max		1996.9	1132.6	1028.5	168.1	1021.9	1651.3	2209.1	454.5
		Average		454.3	615.3	89.4	65.5	119.1	961.6	2209.1	454.5
A15	LEFT	Min	66.2	22.8	31.9	17.1	11.0	47.7	427.2	1278.3	523.9
		Max	1882.4	4564.5	1897.9	866.5	334.3	1378.3	2446.7	5078.6	3529.1
		Average	454.5	1139.7	634.0	115.9	63.8	286.4	1361.5	3178.5	2026.5
	RIGHT	Min	370.0	31.2	5897.3	14.3	6022.8	5191.0		19.4	9824.2
		Max	873.3	1399.0	5897.3	719.4	6022.8	5191.0		19.4	9824.2
		Average	621.7	715.1	5897.3	98.8	6022.8	5191.0		19.4	9824.2
A16	LEFT	Min	16.1	26.6	58.2	72.3	8.8	0.0	18.2	1396.1	1969.5

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
		Max	779.1	1134.2	819.2	2616.2	355.7	372.1	1210.5	2345.5	1969.5
		Average	225.5	236.1	314.9	832.9	88.8	97.3	334.2	1870.8	1969.5
	RIGHT	Min	12.5	17.4	90.6	11.3	8.7	12.8	78.0	30.2	71.1
		Max	1066.2	676.4	598.6	1437.2	750.8	1053.7	3352.0	820.6	2640.5
		Average	399.1	157.0	275.0	233.1	87.2	207.7	898.1	293.8	1217.2
A17	LEFT	Min	51.7	224.7	218.0	11.8	3.3	143.2	431.3	1396.1	165.2
		Max	502.2	1073.9	2147.7	607.0	292.5	655.9	2081.5	3038.5	2321.8
		Average	163.8	721.4	952.5	157.0	48.3	325.0	805.5	2491.0	727.1
	RIGHT	Min	109.6	11.0	165.0	49.1	14.8	12.8	52.2	24.8	71.1
		Max	2186.2	1014.3	779.8	978.8	210.5	275.4	1775.7	580.9	1136.3
		Average	903.7	253.5	350.6	286.7	57.9	65.1	442.3	207.2	440.0
A18	LEFT	Min	64.3	1073.9	391.6	10.6	21.6	64.4	42.1		981.0
		Max	64.3	2204.5	2014.2	879.4	203.2	437.5	42.1		981.0
		Average	64.3	1639.2	932.4	167.8	65.9	136.3	42.1		981.0
	RIGHT	Min	37.4	70.8	36.2	49.1	18.9	42.1	52.2	92.0	24.8
		Max	219.2	504.5	497.6	217.1	161.0	414.8	355.0	331.6	329.2
		Average	86.0	188.4	271.9	79.9	60.3	119.7	152.7	162.8	156.4
B1	LEFT	Min	20.5	27.9	32.4	10.6	8.4	26.4	28.4	155.7	25.0
		Max	1756.8	1058.1	2014.2	1062.4	687.1	839.2	3189.2	6238.7	4400.7
		Average	295.9	380.3	393.6	91.0	62.9	144.3	696.0	2406.8	422.1
	RIGHT	Min	129.5	8.7	17.3	55.0	14.1	18.1	99.1	141.4	24.8
		Max	2096.0	987.5	1381.7	1176.9	1784.1	1298.6	3140.7	1761.6	984.9
		Average	610.2	314.7	217.6	367.3	187.5	261.1	1218.6	575.0	299.8
B2	LEFT	Min	39.8	138.2	90.0	1062.4	19.1	5.4	505.7	2072.6	25.0
		Max	398.6	544.1	103.0	1709.8	454.7	1530.1	1858.1	2221.4	3080.3
		Average	250.5	314.5	94.1	1456.0	104.8	370.2	1349.0	2147.0	1043.4
	RIGHT	Min	36.3	34.8	45.0	31.4	18.3	17.9	32.7	57.3	2815.2
		Max	1099.2	459.5	1658.0	739.0	69.5	663.9	3140.7	372.4	2815.2
		Average	397.7	129.0	622.0	161.8	35.7	229.2	811.2	162.3	2815.2
B3	LEFT	Min	39.8	20.9	64.0	75.8	12.2	73.0	48.2	435.9	383.8
		Max	192.4	500.2	451.2	227.2	110.8	556.2	1683.0	2141.5	1516.7
		Average	112.4	159.9	225.1	144.0	39.0	195.8	395.7	1004.4	761.4
	RIGHT	Min	1362.4	1.2	41.6	12.8	14.9	11.7	25.9	48.8	99.6
		Max	1687.2	459.5	338.4	136.5	713.0	786.7	329.3	437.8	99.6
		Average	1524.8	122.2	178.7	49.3	133.8	95.8	117.0	178.5	99.6
B4	LEFT	Min	481.8	51.7	57.5	12.9	10.4	17.7	169.1	179.0	24.1
		Max	1266.7	2185.5	464.1	121.6	377.9	183.2	1091.7	514.7	139.6
		Average	716.8	763.0	193.0	61.0	132.3	71.8	476.6	290.9	45.7
	RIGHT	Min	160.7	845.6	12.0	1032.9					896.7
		Max	160.7	845.6	163.2	1032.9					896.7
		Average	160.7	845.6	62.4	1032.9					896.7
B5	LEFT	Min	25.5	12.9	40.1	12.9	15.3	28.3	48.5	128.6	24.5
		Max	717.9	1316.4	1058.2	1219.6	377.9	361.6	2141.3	1673.9	730.4
		Average	274.8	260.1	423.9	163.3	120.7	132.9	451.2	601.5	280.6
	RIGHT	Min	19.2	16.5	16.6	21.6	23.9	13.6	34.4	94.7	19.2
		Max	880.8	845.6	753.7	300.5	256.3	828.9	613.6	638.5	1318.2

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
		Average	294.7	226.9	201.4	72.0	95.1	191.6	226.8	346.9	254.7
B6	LEFT	Min	20.5	8.8	71.3	2936.4	17.3	13.8	111.1	577.9	3133.9
		Max	588.6	2746.6	2686.4	2936.4	790.9	676.9	704.3	2922.4	3133.9
		Average	190.3	449.3	738.2	2936.4	265.8	150.6	308.8	1183.0	3133.9
	RIGHT	Min	24.6	45.0	13.9	30.7	16.1	13.6	34.4	149.8	674.9
		Max	1069.3	888.7	510.6	323.1	1154.2	465.3	1133.7	934.2	868.6
		Average	219.5	302.2	125.0	117.1	258.0	138.7	572.3	482.8	771.7
B7	LEFT	Min	13.0	11.2	17.9	15.4	27.9	17.5	171.3	23.1	3384.4
		Max	1053.7	2004.1	987.9	1420.4	765.0	1371.7	3105.0	676.7	3384.4
		Average	139.1	243.3	163.6	340.6	385.2	320.7	1614.7	244.9	3384.4
	RIGHT	Min	15.4	12.8	26.5	12.9	25.2	45.1	16.7	21.5	39.5
		Max	540.8	519.1	869.5	912.6	1154.2	982.1	585.7	552.2	1929.0
		Average	109.1	142.8	135.3	188.3	258.3	177.2	194.9	174.6	394.1
B8	LEFT	Min	19.4	25.0	49.0	17.8	22.8	25.9	365.5	125.2	2648.6
		Max	2035.1	919.1	2655.9	1316.9	147.5	1774.8	1191.2	1390.2	5650.7
		Average	380.2	241.2	552.1	151.9	85.1	508.8	751.8	516.3	4149.7
	RIGHT	Min	28.9	9.2	28.3	16.5	13.0	23.8	75.5	15.8	42.1
		Max	415.4	486.7	548.7	621.2	632.4	435.5	1917.1	188.0	1542.0
		Average	131.1	98.0	204.7	113.0	88.9	103.4	436.8	50.2	464.8
B9	LEFT	Min	12.5	8.3	17.2	10.2	10.9	56.4	79.5	38.9	31.6
		Max	238.3	490.8	211.5	192.1	178.3	1140.7	79.5	113.9	1161.8
		Average	100.7	99.2	73.5	72.5	67.8	250.0	79.5	76.4	302.4
	RIGHT	Min	27.6	26.5	0.0	24.6	17.3	23.8	75.5	68.5	38.5
		Max	461.0	356.6	420.4	1230.8	2285.8	985.9	3148.1	367.0	70.5
		Average	125.9	112.3	74.9	471.6	1151.6	510.9	1584.7	188.2	54.5
B10	LEFT	Min	70.9	15.5	33.7	20.1	26.4	28.4	79.5	38.9	3877.7
		Max	1610.5	295.8	2435.1	1302.9	1260.7	82.5	4421.1	1719.1	3877.7
		Average	262.9	98.3	498.3	194.7	343.9	50.2	1661.8	879.0	3877.7
	RIGHT	Min	13.6	16.3	0.0	24.6	32.3	79.2	45.5	35.4	37.0
		Max	361.3	278.0	304.3	979.0	1225.9	505.0	787.3	1061.1	730.4
		Average	113.9	76.8	103.8	169.8	283.8	291.8	197.9	262.6	252.2
B11	LEFT	Min	14.5	10.1	22.3	7.2	22.5	80.0	29.3	40.6	407.7
		Max	622.2	1984.4	558.5	1039.3	1349.8	1454.8	2626.9	4017.5	956.9
		Average	152.4	365.4	120.8	121.3	344.3	767.4	602.2	1366.2	679.4
	RIGHT	Min	15.4	14.2	18.3	15.3	13.2	23.7	31.7	101.6	465.5
		Max	478.4	1287.6	325.3	2126.3	1271.8	946.7	655.2	1097.3	1926.8
		Average	108.5	209.7	74.6	299.4	194.1	256.0	241.9	289.3	1030.7
B12	LEFT	Min	11.7	21.4	17.2	19.9	17.9	33.7	538.8	25.7	136.3
		Max	81.0	438.9	89.0	1969.3	1349.8	172.3	1291.0	276.3	2357.3
		Average	37.4	123.4	36.7	319.0	243.1	75.1	914.9	121.4	876.7
	RIGHT	Min	35.4	105.5	28.6	22.1	1271.8	2125.6	14.2	10.3	175.5
		Max	2786.2	1251.7	258.6	745.5	1271.8	2125.6	1032.6	411.8	2562.4
		Average	729.6	375.1	106.8	383.8	1271.8	2125.6	196.6	177.4	932.3
C1	LEFT	Min	12.2	20.2	24.3	34.8	10.3	51.8	36.5	13.3	2357.3
		Max	449.6	691.4	503.4	797.3	727.1	483.7	2637.3	607.1	3078.1
		Average	190.8	235.2	126.9	162.6	108.6	163.0	727.1	201.8	2717.7

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
	RIGHT	Min	38.3	19.0	19.1	22.1	441.7	22.6	17.1	74.7	2562.4
		Max	1195.4	417.0	228.1	3009.2	735.2	1012.7	1170.3	1855.0	3659.1
		Average	459.0	122.2	64.4	1081.8	588.4	227.2	451.3	479.0	3105.4
C2	LEFT	Min	0.0	20.2	34.9	18.2	22.5	34.6	36.5	51.6	437.3
		Max	995.5	332.9	643.7	797.3	727.1	683.0	373.5	816.2	3078.1
		Average	192.4	99.7	159.1	186.3	213.1	233.1	154.1	304.7	1524.7
	RIGHT	Min	18.7	13.6	22.0	52.2		2143.4		3772.6	43.5
		Max	1122.6	1457.7	1585.6	52.2		2143.4		3772.6	43.5
		Average	386.7	385.1	543.2	52.2		2143.4		3772.6	43.5
C3	LEFT	Min	12.4	35.8	68.4	18.2	9.8	19.6	0.0	327.4	306.6
		Max	459.2	802.5	716.0	63.8	368.0	320.9	0.0	327.4	1068.7
		Average	169.5	173.0	167.9	38.5	71.8	91.0	0.0	327.4	511.3
	RIGHT	Min	9.1	32.5	53.1	15.9	7.0	25.7	124.3	88.4	43.5
		Max	826.2	419.1	1114.3	282.8	96.5	334.5	2451.6	824.8	182.6
		Average	126.0	124.4	232.3	69.5	37.2	115.5	900.1	317.9	122.4
C4	LEFT	Min	197.4	55.2	34.0	21.2	26.2	26.4	0.0	327.4	216.9
		Max	717.3	1749.5	451.2	77.0	37.3	37.7	1437.8	1999.8	1362.7
		Average	334.7	598.6	183.1	41.4	29.9	30.4	479.3	884.9	598.8
	RIGHT	Min	10.6	27.5	43.3	88.4	34.1	334.5	115.7	1476.3	396.8
		Max	596.6	996.8	766.9	88.4	34.1	334.5	115.7	1493.3	396.8
		Average	265.9	201.2	235.2	88.4	34.1	334.5	115.7	1484.8	396.8
C5	LEFT	Min	2471.8	1749.5	2344.9	87.7		93.5		2402.7	
		Max	2471.8	1749.5	2344.9	124.3		93.5		2402.7	
		Average	2471.8	1749.5	2344.9	99.9		93.5		2402.7	
	RIGHT	Min	79.9	8.5	17.8	190.0	27.9	23.5	115.7	601.6	68.2
		Max	298.9	996.8	615.9	404.8	1114.8	614.3	215.3	1493.3	556.3
		Average	152.8	192.8	139.9	244.7	236.4	206.5	149.9	898.8	297.3
C6	LEFT	Min	18.1	12.0	176.1	24.2	19.5	50.1	1216.5	59.9	48.9
		Max	1304.9	650.3	884.2	346.4	536.5	121.1	1655.4	1063.5	424.9
		Average	230.0	175.1	533.8	123.3	162.2	78.7	1362.8	306.6	306.9
	RIGHT	Min	55.2	12.9	19.6	14.9	12.4	27.7	777.1	769.5	45.0
		Max	1403.3	948.5	817.3	193.8	326.8	482.0	1023.6	1214.9	45.0
		Average	291.2	385.4	273.4	45.8	71.3	176.1	900.4	992.2	45.0
C7	LEFT	Min	8.0	7.0	40.2	24.2	9.5	18.3	93.4	59.9	8.1
		Max	655.6	2008.4	884.2	252.8	568.3	625.1	1655.4	1746.6	862.5
		Average	155.2	169.7	239.6	117.9	111.7	104.5	534.8	523.0	130.6
	RIGHT	Min	30.4	0.0	19.6	16.5	9.3	17.7	98.5	48.5	47.9
		Max	1103.0	1005.0	629.7	1292.8	708.2	874.2	1023.6	1809.0	3025.6
		Average	354.8	198.3	209.3	150.1	127.2	223.0	466.7	747.1	668.6
C8	LEFT	Min	15.1	26.7	639.8	5.9	35.2	31.3	1749.3	453.1	1264.8
		Max	93.1	1264.7	2475.4	2958.0	145.5	2440.3	1903.1	2317.5	5630.2
		Average	57.5	237.5	1251.7	767.9	75.1	638.7	1851.9	1282.4	3447.5
	RIGHT	Min	29.9	39.1	132.3	29.6	23.3	152.6	437.7	39.6	193.0
		Max	690.3	1172.9	1238.9	194.3	78.4	1135.8	745.5	1364.8	402.6
		Average	217.4	298.6	350.7	95.7	38.4	445.3	591.6	373.2	262.9
C9	LEFT	Min	12.6	28.6	19.8	20.0	13.6	25.3	31.6	16.7	27.4

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
		Max	927.3	1339.0	1670.1	338.5	571.6	1038.6	1749.3	1906.1	1264.8
		Average	183.9	397.9	620.7	96.8	98.8	261.8	367.3	404.6	245.3
	RIGHT	Min	10.2	12.7	118.3	41.6	29.0	50.7	213.5	80.7	193.0
		Max	1074.9	1043.0	1775.4	798.7	813.9	940.0	213.5	1281.4	3677.4
		Average	138.7	270.9	551.2	245.2	234.2	285.3	213.5	599.3	1178.8
C10	LEFT	Min	14.4	689.3	13.0	98.7	101.4	37.4	42.3	165.0	115.0
		Max	836.7	1111.3	793.6	1420.0	707.2	766.0	755.8	620.2	4331.5
		Average	330.8	829.9	163.0	559.7	384.3	326.6	193.8	291.7	1663.5
	RIGHT	Min	496.7	62.5	34.6	10.7	20.8	21.2		3697.5	2712.9
		Max	4202.7	581.3	419.9	231.2	532.4	448.5		3697.5	2712.9
		Average	1732.0	270.9	118.1	88.4	238.3	143.6		3697.5	2712.9
C11	LEFT	Min	12.5	207.0	88.4	9.2	22.1	21.4	42.3	75.2	85.2
		Max	2150.8	2316.2	2087.5	862.8	2310.4	1531.8	2766.5	1366.0	1350.6
		Average	421.7	688.4	631.4	198.0	270.2	306.7	762.3	364.4	433.6
	RIGHT	Min	0.0	18.8	26.9	14.5	12.9	17.9	70.6	9571.7	68.8
		Max	860.7	801.2	1689.0	652.9	1127.6	1908.3	438.2	9571.7	104.9
		Average	126.9	193.6	522.7	96.2	195.6	422.8	241.7	9571.7	80.8
C12	LEFT	Min	18.4	12.6	18.9	30.3	12.1	35.3	687.5	523.0	53.4
		Max	924.5	1622.4	1107.4	556.9	730.3	1222.2	5442.7	1357.1	1350.6
		Average	309.8	742.4	519.4	143.5	164.2	445.1	2272.6	801.0	549.2
	RIGHT	Min	24.1	5.0	16.9	13.7	7.6	21.4	19.5	13.2	151.6
		Max	1107.2	2514.7	1401.2	1539.1	1398.8	1326.7	748.5	3085.1	2910.7
		Average	191.3	418.3	267.0	366.7	504.3	291.7	173.5	548.0	909.9
C13	LEFT	Min	156.9	60.5	49.1	18.0	7.2	19.7	122.2	69.6	53.4
		Max	615.2	711.4	1694.2	81.5	333.5	329.7	270.6	404.2	306.0
		Average	336.8	242.2	407.5	43.8	107.9	136.8	196.4	183.6	186.8
	RIGHT	Min	12.8	7.5	142.3	36.8	10.9	20.1	3838.7	11.3	734.7
		Max	1258.8	892.3	1470.1	441.2	1947.9	1135.1	3838.7	303.8	3406.3
		Average	291.7	255.2	659.3	196.8	335.9	288.5	3838.7	108.8	2070.5
C14	LEFT	Min	91.1	11.0	115.1	8.9	5.6	26.2	80.6	183.5	30.1
		Max	2438.1	438.7	1172.0	973.7	807.3	1769.0	2780.8	3246.0	1253.3
		Average	440.7	109.3	623.2	248.0	210.9	294.0	616.0	1089.1	717.3
	RIGHT	Min	52.3	4.8	36.6	107.0	11.6	19.9	167.0	204.8	73.0
		Max	1258.8	1264.7	2626.8	670.6	1253.5	888.6	2210.5	3901.7	734.7
		Average	380.2	222.9	557.1	280.8	320.1	286.2	624.9	1080.6	442.4
C15	LEFT	Min		846.0	46.1	41.4	32.8	212.3	80.6		28.7
		Max		1146.1	1147.8	973.7	632.4	1769.0	4209.7		900.2
		Average		968.4	299.5	340.4	201.6	731.2	2145.1		280.3
	RIGHT	Min	60.5	12.5	213.4	1231.0	11.5	27.8	1208.4	4138.7	615.9
		Max	354.8	66.0	1045.9	2186.0	1413.9	1648.4	1744.5	4138.7	615.9
		Average	166.3	34.0	490.9	1708.5	332.2	446.9	1387.1	4138.7	615.9
C16	LEFT	Min	13.5	210.6	27.6	20.0	9.1	34.1	150.9	270.8	76.6
		Max	1732.3	2307.1	3662.1	3837.6	632.4	1318.8	150.9	726.1	239.0
		Average	369.1	792.6	412.5	592.0	236.1	254.0	150.9	422.6	157.3
	RIGHT	Min	0.0	16.1	18.3	8.9	14.1	36.6	79.6	6.7	27.1
		Max	1021.4	391.9	956.5	193.1	1079.5	471.9	879.8	654.3	2427.3

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
		Average	171.6	107.5	161.0	75.7	221.0	185.7	375.9	280.7	509.4
C17	LEFT	Min	34.4	21.7	29.8	23.9	9.1	15.2	68.6	6753.5	164.4
		Max	34.4	37.2	298.5	3837.6	179.8	82.0	69.1	6753.5	164.4
		Average	34.4	29.4	191.2	662.3	40.1	34.0	68.8	6753.5	164.4
	RIGHT	Min	554.0	145.6	1246.1	40.2	14.1	36.6	498.2	12.9	88.7
		Max	1021.4	263.5	2164.7	1484.6	838.1	660.1	1137.9	1772.9	1892.3
		Average	709.8	186.2	1705.4	415.0	371.9	181.1	818.0	685.1	927.9
C18	LEFT	Min	23.2	37.2	29.8	31.0	23.1	22.8			
		Max	464.2	112.0	29.8	31.0	3223.4	3205.2			
		Average	145.2	62.1	29.8	31.0	832.8	1614.0			
	RIGHT	Min	226.7	138.9	226.9	241.8	12.4	37.6	305.4	1445.2	261.4
		Max	1105.3	461.5	564.5	241.8	1107.6	963.6	305.4	1445.2	618.1
		Average	585.0	251.5	368.4	241.8	321.9	338.6	305.4	1445.2	380.3
C19	LEFT	Min	0.0	18.2	70.2	27.1	155.5	112.3	20.2	61.4	434.5
		Max	821.0	656.5	1304.0	27.1	1458.4	1085.4	4084.7	3879.6	1344.0
		Average	320.9	313.6	389.7	27.1	663.0	482.3	677.8	904.0	737.6
	RIGHT	Min	31.5	12.6	18.2	87.5	1436.2	51.2	302.4	90.3	76.0
		Max	779.9	1777.7	2219.9	2980.9	1896.8	3782.8	1452.1	2311.2	1049.9
		Average	184.4	231.2	318.7	1084.2	1670.6	627.7	498.3	1200.8	318.3
C20	LEFT	Min	48.2	349.8	26.2	668.4	926.3	37.2	444.2	38.9	4188.7
		Max	2038.6	843.0	1517.3	668.4	1903.1	1602.5	699.9	784.4	4188.7
		Average	706.4	564.6	725.9	668.4	1414.7	717.0	572.1	215.4	4188.7
	RIGHT	Min	23.0	99.1	23.7	101.8	34.3	57.9	238.8	4099.3	497.3
		Max	1041.5	555.7	920.5	2935.0	1474.9	425.2	4232.2	4099.3	3500.9
		Average	182.9	253.4	272.8	935.5	410.4	208.7	1569.9	4099.3	1498.5
C21	LEFT	Min	18.4	127.3	471.6	218.8	42.5	2191.5	102.8	1699.5	0.0
		Max	2496.3	971.2	1445.9	1844.9	2725.4	2194.6	3549.2	1699.5	1615.4
		Average	452.4	511.9	751.5	1031.8	936.8	2192.5	1251.6	1699.5	326.6
	RIGHT	Min	11.9	9.6	20.0	101.8	190.6	166.0	24.9	1384.4	666.9
		Max	587.6	372.5	844.6	259.8	3035.7	3566.7	3096.3	2634.0	3032.4
		Average	105.5	84.9	90.7	157.0	1018.2	1217.6	1012.3	2009.2	1733.8
D1	LEFT	Min	22.6	22.3	1994.9	3485.3	2069.3	2006.6	1282.1	2524.4	1615.4
		Max	2760.6	1973.4	4051.8	3560.6	2069.3	2006.6	3102.9	3524.1	2695.3
		Average	1072.3	488.4	2863.8	3510.4	2069.3	2006.6	1889.0	2857.6	2361.5
	RIGHT	Min	20.0	38.8	43.5	110.1	50.3	48.5	2575.4	224.2	274.4
		Max	2836.1	454.8	2684.1	511.8	716.1	702.1	2833.3	1384.4	274.4
		Average	997.1	263.2	765.5	377.9	412.0	275.8	2661.4	611.0	274.4
D2	LEFT	Min	39.1	17.3	32.0	3560.6	2069.3	2006.6	4192.9		5680.7
		Max	2735.0	1973.4	2255.4	3560.6	2524.0	7106.2	4192.9		5680.7
		Average	856.5	460.7	577.4	3560.6	2296.6	4556.4	4192.9		5680.7
	RIGHT	Min	31.1	12.0	20.8	67.4	2948.2	2139.8			1124.6
		Max	986.8	1329.1	1311.6	3140.7	4573.1	5551.7			3673.6
		Average	260.0	502.4	408.3	1112.4	3864.4	3845.8			1974.3
D3	LEFT	Min	23.7	19.0	25.3	6695.9	155.4	159.3	46.4	42.2	34.0
		Max	711.8	1010.0	1130.0	6695.9	2522.0	4420.5	2922.4	2561.6	1576.7
		Average	201.8	185.1	141.8	6695.9	1338.7	1561.2	1204.2	1365.9	805.4

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
	RIGHT	Min	305.1	73.6	12.2	67.4	42.8	58.6	66.8		1124.6
		Max	628.5	870.0	799.5	2395.0	306.3	3811.9	147.3		8571.4
		Average	409.1	320.3	253.6	1105.1	144.0	1309.7	93.7		4848.0
D4	LEFT	Min	11.7	7.9	20.4	0.0	155.4	121.1	83.5	164.9	34.0
		Max	1042.5	965.6	1226.8	4765.8	2309.5	4420.5	4199.5	5075.3	2143.6
		Average	170.5	113.2	209.4	1351.1	885.5	877.2	795.9	1425.9	705.3
	RIGHT	Min	24.2	7.3	9.3	59.0	91.4	984.2		36.3	1737.7
		Max	561.3	1191.8	596.2	496.8	464.4	3386.1		36.3	8571.4
		Average	143.1	187.5	149.2	136.2	286.2	2174.7		36.3	4015.6
D5	LEFT	Min	13.5	13.9	11.8	0.0	53.3	15.2	76.8	298.5	3040.7
		Max	305.8	313.0	451.8	3908.3	256.3	2762.3	490.8	2859.8	3040.7
		Average	73.9	87.0	109.3	949.0	122.5	358.3	163.8	1579.2	3040.7
	RIGHT	Min	12.1	7.9	13.4	18.9	31.4	63.7	36.2	14.6	39.8
		Max	626.8	452.0	260.1	763.2	2169.5	3099.4	2121.5	1824.5	940.4
		Average	97.3	74.4	87.6	177.9	500.3	427.6	496.8	340.9	289.0
D6	LEFT	Min	92.7	8.2	8.7	13.3	249.2	31.0	35.2	53.3	62.0
		Max	134.4	296.9	502.1	201.3	827.8	1295.1	631.0	1741.5	1305.3
		Average	106.7	73.5	134.6	63.3	442.0	324.1	250.0	384.2	388.6
	RIGHT	Min	11.2	0.0	7.2	19.6	16.1	21.1	2121.5	87.3	92.4
		Max	300.5	430.8	230.7	1878.0	1296.4	1098.8	2121.5	87.3	940.4
		Average	75.7	75.2	65.8	262.5	350.5	384.3	2121.5	87.3	264.1
D7	LEFT	Min	10.7	23.0	12.4	19.9	10.5	13.9	1743.3	53.3	256.8
		Max	358.4	513.2	413.4	285.4	231.0	369.9	1743.3	3349.0	1156.9
		Average	90.6	105.1	147.3	78.2	73.7	154.6	1743.3	1536.4	828.5
	RIGHT	Min	10.8	0.0	22.3	45.0	12.8	76.5	10.6	3472.9	375.2
		Max	133.3	794.4	948.6	2667.0	1436.3	409.6	116.3	3472.9	2910.6
		Average	62.8	127.7	404.2	528.3	255.2	134.6	71.8	3472.9	1555.9
D8	LEFT	Min	10.7	0.0	47.8	68.8	37.9	14.5	54.2	2073.3	2923.4
		Max	251.6	254.4	361.9	2311.0	147.9	423.9	258.6	3269.1	3671.4
		Average	77.2	107.5	170.0	371.3	97.2	133.2	110.3	2671.2	3172.7
	RIGHT	Min	6.2	14.9	25.9	27.6	19.4	33.6	128.2	177.3	506.4
		Max	337.8	560.1	672.3	581.2	1242.6	977.0	1216.0	619.9	668.8
		Average	78.2	135.3	160.6	147.8	254.3	199.0	449.5	324.8	612.1
D9	LEFT	Min	22.4	8.5	34.6	60.0	0.0	14.9	310.5	904.5	4706.4
		Max	257.0	274.4	618.8	96.2	329.2	317.9	986.6	1106.0	4706.4
		Average	83.1	89.0	195.6	77.0	120.7	112.9	529.1	976.1	4706.4
	RIGHT	Min	96.6	21.0	321.1	2374.8	177.3	151.0	1415.3		
		Max	357.3	105.1	321.1	2374.8	1108.8	1014.4	1415.3		
		Average	145.6	46.7	321.1	2374.8	487.8	375.9	1415.3		
D10	LEFT	Min	12.4	14.8	11.7	8.9	0.0	18.2	204.7	1106.0	365.1
		Max	484.8	1129.1	851.9	139.9	664.1	769.1	3085.8	3180.4	4706.4
		Average	113.9	145.7	135.9	50.6	151.3	144.6	776.3	2404.3	1348.9
	RIGHT	Min	4.5	9.0	0.0	14.4	21.5	15.9	3503.1	621.1	1786.8
		Max	1019.0	1122.0	838.2	1966.8	1152.2	138.7	3503.1	3040.3	1786.8
		Average	159.4	118.3	120.8	361.4	161.9	58.6	3503.1	1427.5	1786.8
D11	LEFT	Min	10.4	11.1	14.4	14.0	16.5	12.3	62.1	3180.4	816.7

Reach	Bank	Statistic	Shrub			Closed Timber			Open Timber		
			1950	1976	2001	1950	1976	2001	1950	1976	2001
		Max	129.8	991.9	377.0	308.4	135.8	426.5	1319.3	3180.4	1519.4
		Average	56.8	158.4	113.9	82.6	54.1	171.6	468.8	3180.4	1285.1
	RIGHT	Min	9.5	10.4	12.1	7.4	25.4	13.4	138.2	976.4	917.5
		Max	371.3	369.4	1031.7	473.4	205.9	205.1	138.2	976.4	1846.3
		Average	36.6	113.1	192.9	94.8	72.2	53.3	138.2	976.4	1227.1
D12	LEFT	Min	0.0	7.5	14.5	14.4	32.6	15.2	53.1	2163.7	816.7
		Max	614.3	505.7	814.1	328.1	596.4	274.3	3601.6	6217.3	4164.3
		Average	76.6	111.3	230.3	139.3	164.2	70.1	872.5	3416.7	1732.8
	RIGHT	Min	13.5	6.7	12.7	41.1	18.5	10.7	28.0		199.2
		Max	469.3	2142.0	1156.6	309.2	169.8	557.3	1400.0		6200.0
		Average	112.0	275.6	225.9	98.3	59.3	87.0	502.2		2627.5
D13	LEFT	Min	19.4	9.4	13.6	37.0	25.1	0.0		3122.0	468.8
		Max	212.1	671.7	733.0	942.5	416.0	372.4		5524.7	468.8
		Average	91.9	190.0	185.7	308.5	124.7	107.2		4323.4	468.8
	RIGHT	Min	20.5	5.9	36.4	13.4	11.7	16.2	71.3	4617.6	
		Max	469.3	846.5	1037.9	1181.1	130.6	640.2	246.3	4617.6	
		Average	58.2	122.6	232.0	190.1	52.7	111.1	159.6	4617.6	
D14	LEFT	Min	0.0	20.3	12.5	59.3	123.1	32.8	3839.8	14696.4	725.3
		Max	328.0	1306.4	1915.7	1491.0	2608.1	1119.2	3839.8	14696.4	4446.2
		Average	81.8	274.1	288.1	482.5	419.1	281.2	3839.8	14696.4	1965.6
	RIGHT	Min	7.8	52.1	15.1	222.5	24.2	9.0	511.4	4528.6	14877.8
		Max	629.4	572.9	820.6	1217.1	996.2	466.7	1675.3	4528.6	14877.8
		Average	160.8	142.8	191.6	445.8	212.7	105.2	895.0	4528.6	14877.8
D15	LEFT	Min	13.3		16.7	145.8		19.7	321.8		1344.9
		Max	463.6		1378.0	327.6		1683.2	556.4		1344.9
		Average	131.7		267.2	241.3		283.1	381.6		1344.9
	RIGHT	Min	87.0		60.5	85.2		32.5			5013.1
		Max	1974.5		1749.1	85.2		990.7			5013.1
		Average	716.2		368.9	85.2		279.1			5013.1
D16	LEFT	Min	22.9		11.4	18.5		0.0	408.1		263.7
		Max	723.7		1608.7	1513.2		361.4	1774.3		1366.7
		Average	153.2		186.3	419.1		151.2	863.5		532.7
	RIGHT	Min	0.0		15.7	14.6		21.9	1044.0		1274.5
		Max	884.1		1337.5	311.3		628.3	1044.0		4028.9
		Average	364.7		153.5	117.0		164.7	1044.0		2192.6