Stream Geometry and Sketch Map

Stream Geometry and Sketch Map Overview

Example sketch map, Figure A-15.

Site Sketch Form

Geometry Instructions

Stream Geometry and Sketch Map

The measured geometry and sketch map characterize and document the plan form of the stream through the study reach. Sinuosity, belt width, stream meander length, linear wavelength and radius of curvature are measured. Plan-view geometry is best measured with recent, large-scale aerial photographs. All measurements should represent the range (minimum, maximum) and average values for the geometry variables. Record all geometry values and ratios in **Worksheet A-3**.

Geometry Instructions

1. Develop familiarity of the designated reach by walking the entire length while looking at the aerial photograph (sometimes it is also helpful to view the reach from a high point).
2. Observe floodplains, terraces, abandoned channels, bedrock outcrops and laterally confining hillslopes or roads.
3. Draw the reach to scale (**Figure A-20**). Make sure to note cross-section locations. Note any changes that have occurred since the aerial photograph was taken.
4. Using the aerial photograph, measure sinuosity, belt width, stream meander length, linear wavelength and radius of curvature and delineate the reach and cross-section. Report the geometry measurements as ranges (minimum, maximum, mean) and as ratios to the bankfull width (e.g., R_c / W_{bkf}). Field measure any areas where the channel has shifted substantially since the date of the aerial photograph.
5. Record all geometry data in **Worksheet A-3** and on the sketch map.

Sketch Map

The sketch map documents the location of the study reach, cross-section and measurement sites in relation to the landscape and verifies that the plan form of the stream has not significantly changed since the aerial photograph was taken. A broad-level valley cross-section showing channel, floodplains and terrace features in relation to the plan view are included on the sketch map. **Table A-7** lists the items necessary to include on the sketch map, and **Figure A-20** is an example sketch map.

Table A-7. List of minimum items to include on sketch map.

Sketch Map Items	
• Stream name and location • Date • Surveyors • North arrow • Scale of map • Legend • Direction of streamflow • Benchmark locations • Floodplain boundaries • Terrace features • Vegetation	• Landmarks including trees, logs, rocks, debris, dams, etc. • Valley cross-section (including flood-plain and terrace features) • Cross-section locations • Longitudinal profile stationing • Pebble count locations or transects • Meander geometry measurements • Bar features and bar sample locations • Abandoned channels

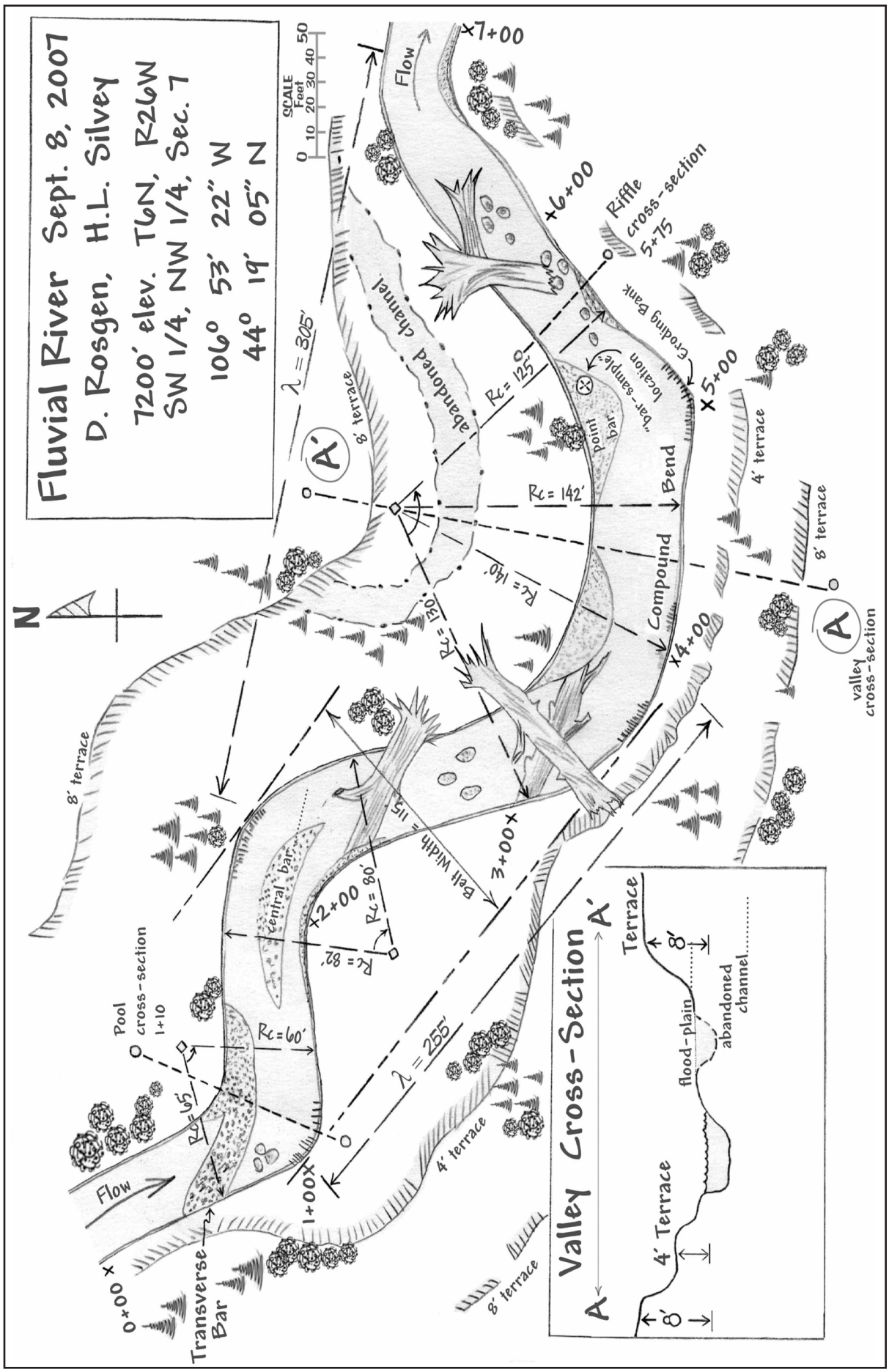

Figure A-20. Example sketch map.

AREA-SITE LOCATION....REACH MAP

Stream: _____ Reach: _____

Drawn By: _____ Date: _____

Sinuosity (k)

Sinuosity is the only plan-form parameter used in the initial delineation of stream types at Level II (**Worksheet A-1**). *Sinuosity* describes how the stream has adjusted its slope in relation to the slope of its valley and is quantitatively described as the ratio of stream length (SL) to valley length (VL) and also as the ratio of valley slope (S_{val}) to channel slope (S). The stream and valley lengths are measured from two common points in a direction that is parallel with the fall line of the valley (**Figure A-21**). Valley slope (S_{val}) is measured as the water surface elevation difference between the same bed features (e.g., riffle to riffle) along the fall line of the valley divided by the valley length between the selected bed features.

A third method can also be used to estimate sinuosity for reaches less than 40 bankfull widths, described as the ratio of Stream Meander Length (L_m) to Linear Wavelength (λ).

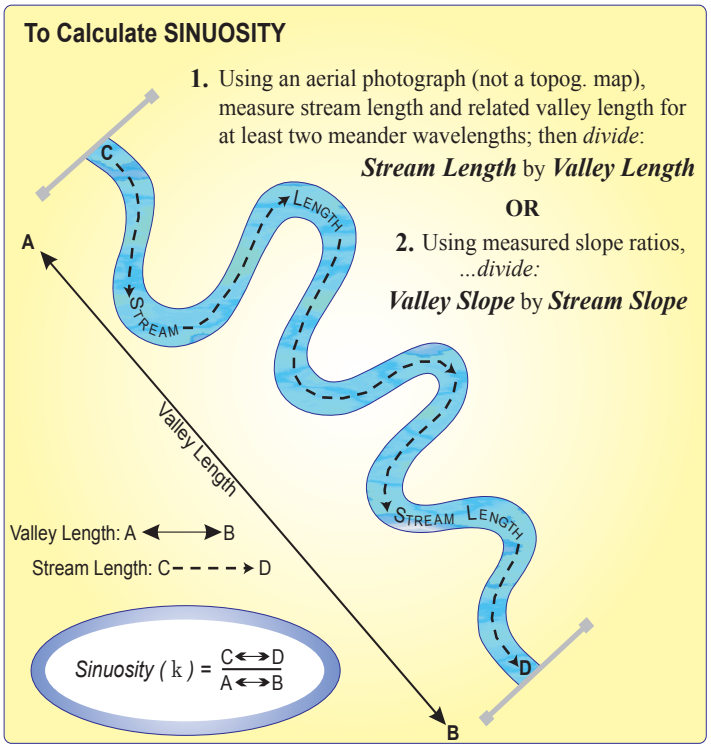

Figure A-21. Sinuosity diagram.

Belt Width (W_{blt})

Belt width is the lateral distance (perpendicular to valley) between the outside edges of two meanders that occupy opposite sides of the valley (**Figure A-22**). Belt width is used as an index of the lateral containment or confinement of a stream when compared with the width of the channel. *Meander Width Ratio (MWR)* is the belt width divided by the bankfull width. Various meander width ratios by stream type are shown in **Figure A-23**.

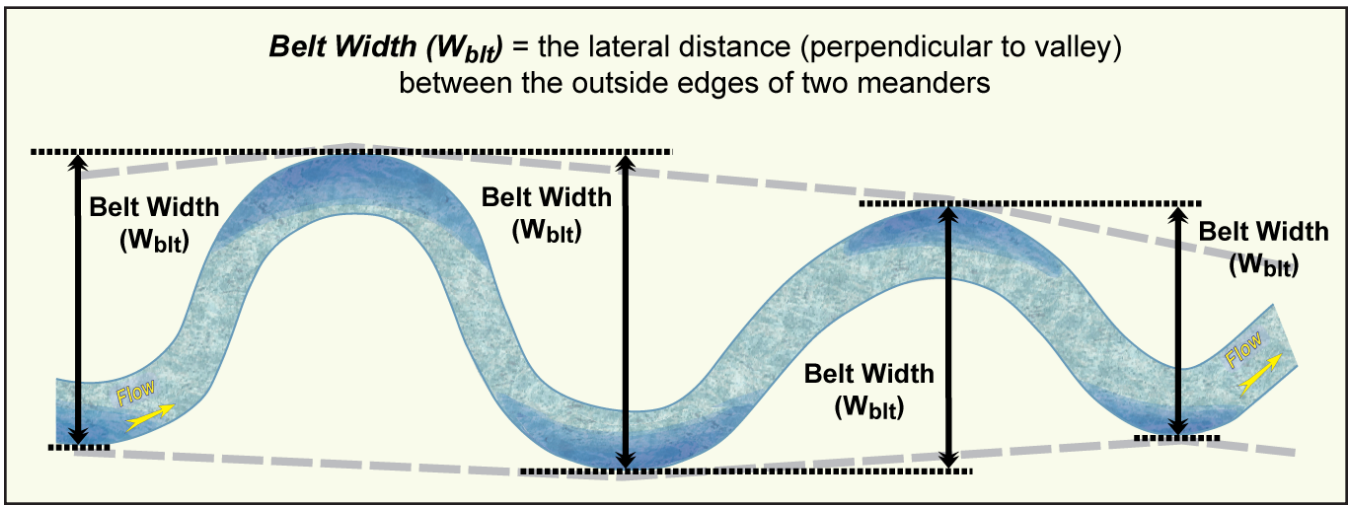

Figure A-22. Meander geometry diagram for Belt Width (W_{blt}) measurements.

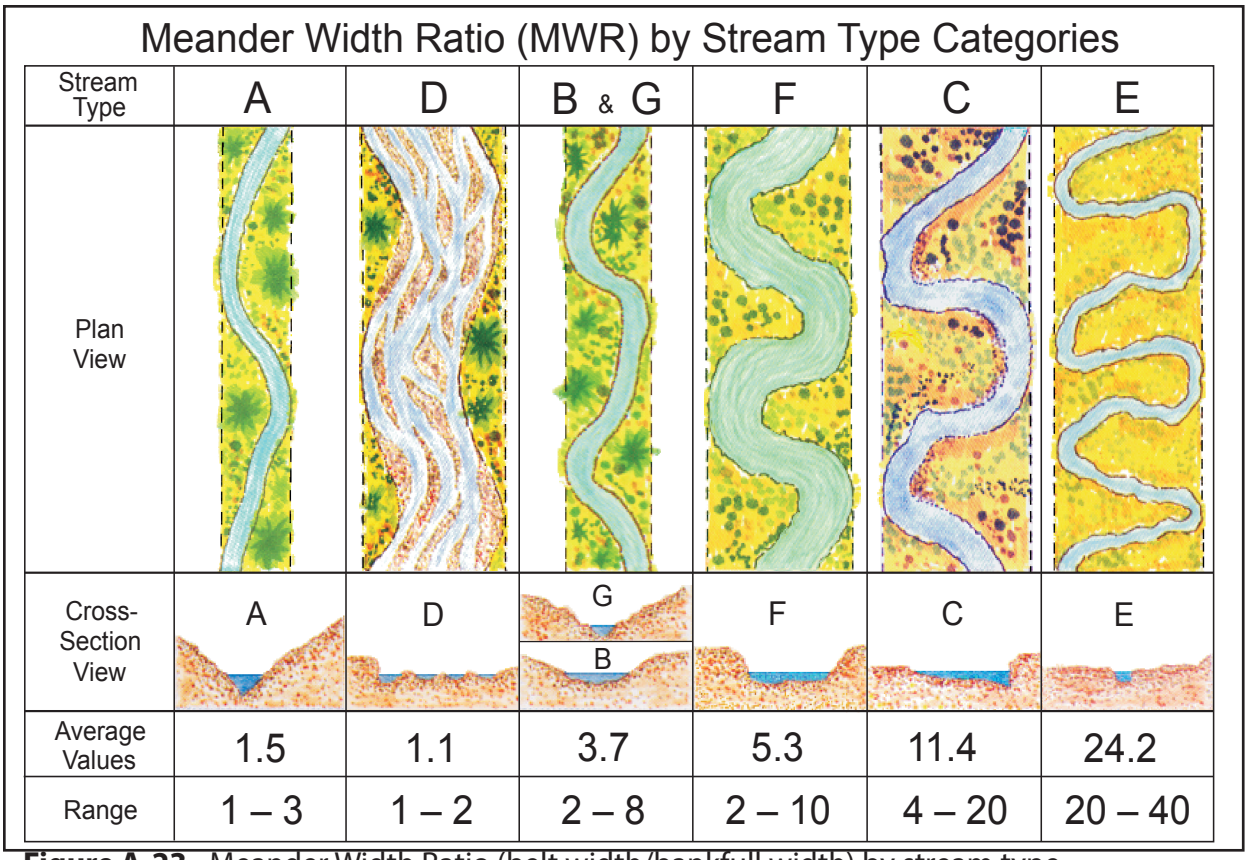

Figure A-23. Meander Width Ratio (belt width/bankfull width) by stream type.

Stream Meander Length (L_m)

Stream Meander Length is the channel distance between the apex of two sequential meanders (**Figure A-24**) . *Meander length ratio* is the stream meander length divided by the bankfull width (L_m / W_{bkf}).

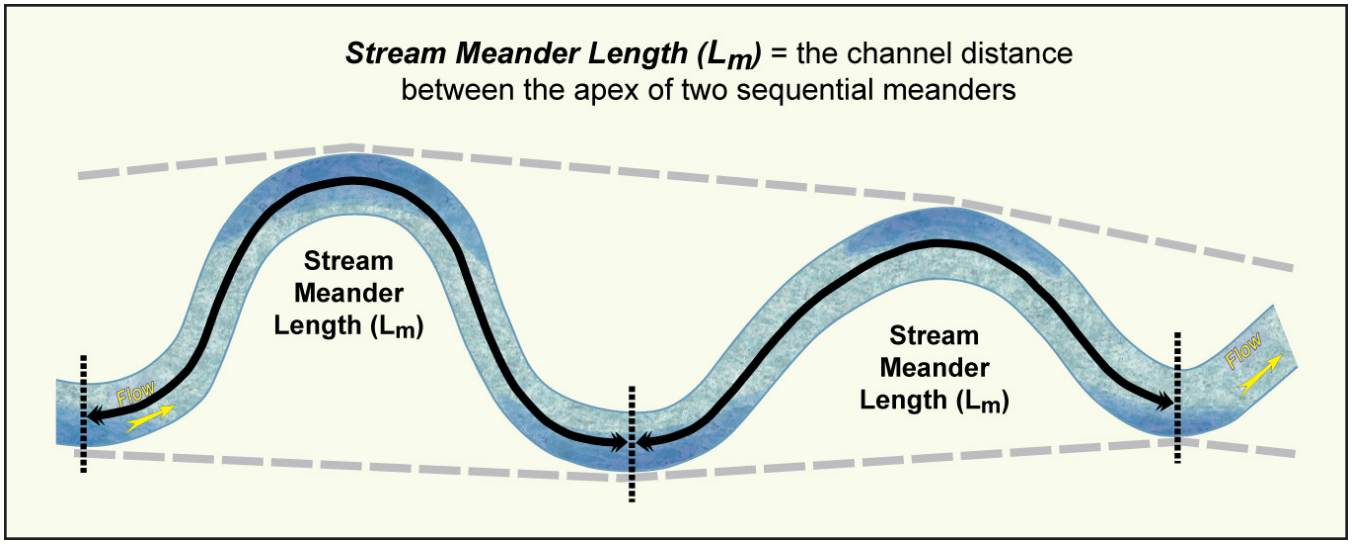

Figure A-24. Meander geometry diagram for Stream Meander Length (L_m) measurements.

Linear Wavelength (λ)

Linear wavelength is the longitudinal distance parallel with the fall line of the valley between the apex of two sequential meanders (**Figure A-25**) and is negatively correlated with sinuosity. *Linear wavelength* is expressed as a ratio to the bankfull width (λ / W_{bkf}).

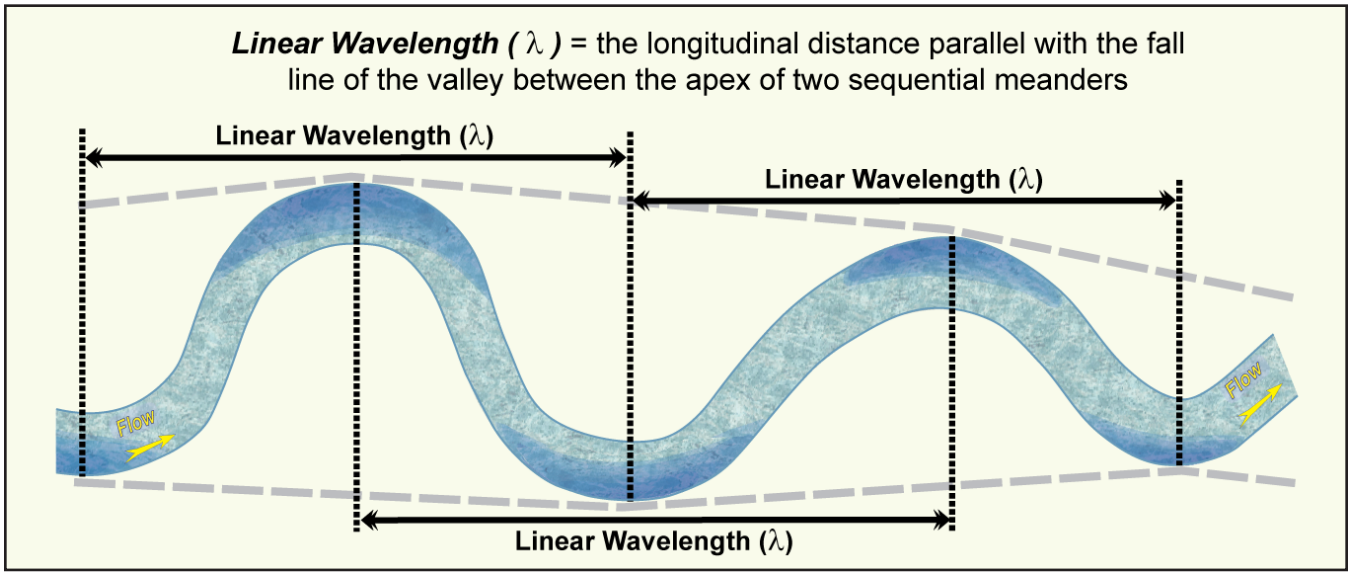

Figure A-25. Meander geometry diagram for Linear Wavelength (λ) measurements.

Radius of Curvature (R_c)

Radius of curvature is a measure of the "tightness" of an individual meander bend and is negatively correlated with sinuosity. Radius of curvature is measured from the outside of the bankfull channel to the intersection point of two lines that perpendicularly bisect the tangent lines of each curve departure point (**Figure A-26**). Measurements taken in compound pools *vs.* compound bends are shown in **Figure A-27**. Radius of curvature is expressed as a ratio to the bankfull channel width (R_c / W_{bkf}).

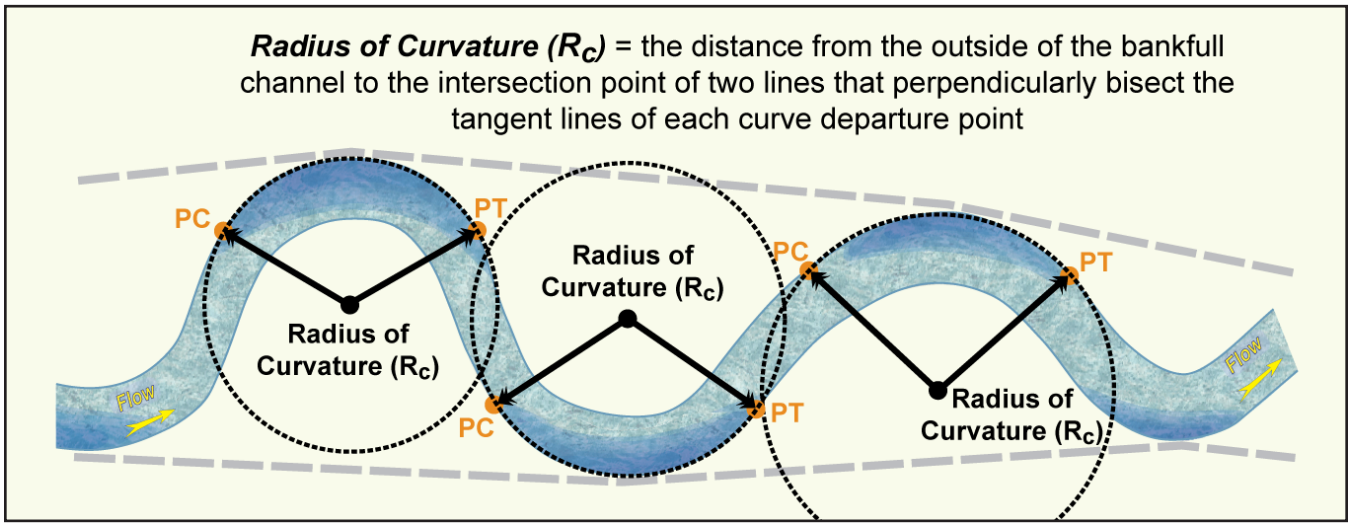

Figure A-26. Meander geometry diagram for Radius of Curvature (R_c) measurements.

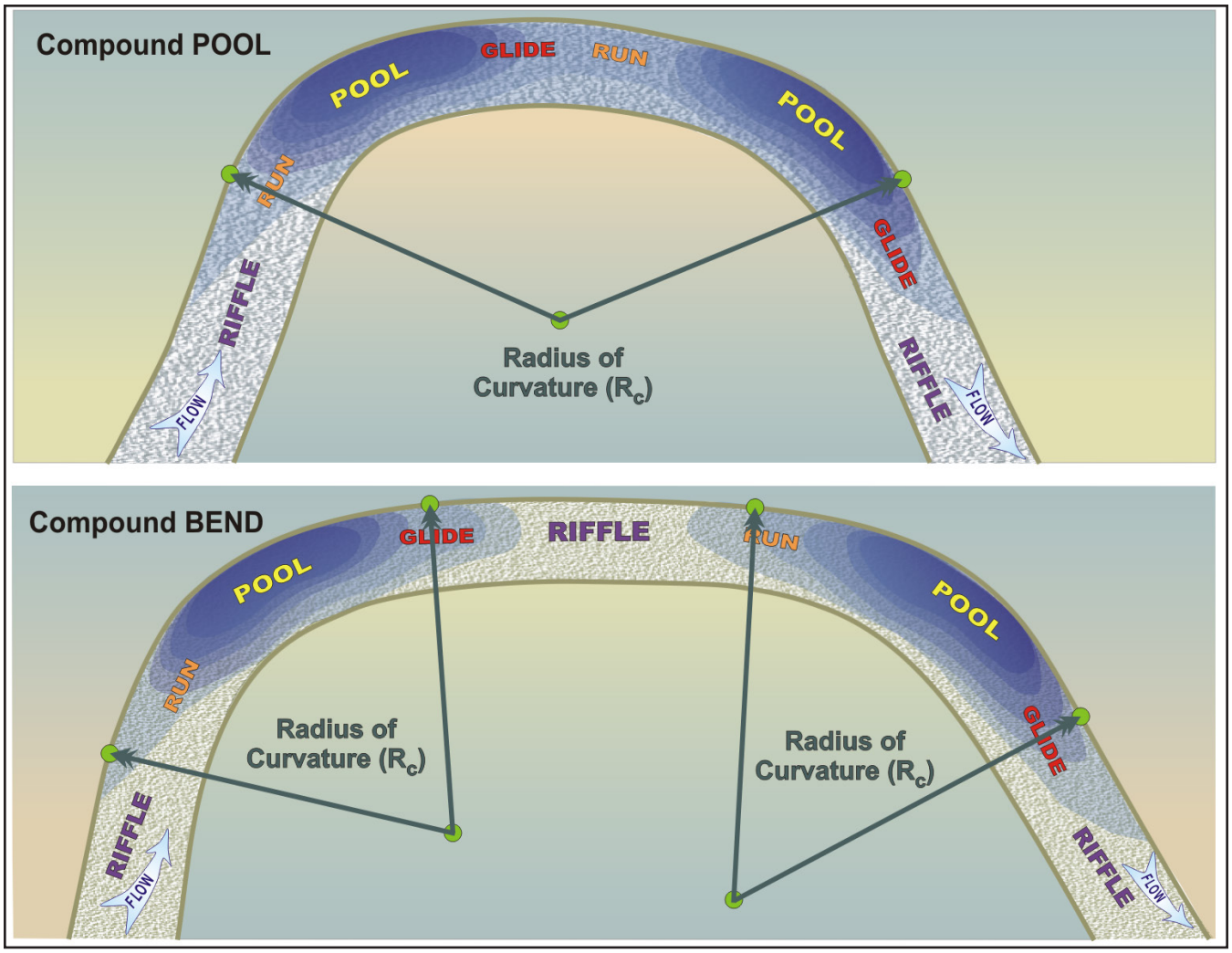

Figure A-27. Radius of Curvature (R_c) measurements in a compound pool *vs*. bend.