A drainage basin or watershed is the area throughout which surface water drains into a particular body of surface water. The body of water might be a stream, lake, wetland, ocean, spring or pond. Be aware that a surface-water drainage basin is not necessarily the same as ground water drainage basin. In a ground water drainage basin, we delineate the area throughout which groundwater drains into a particular aquifer or out of a particular discharge area. This might or might not coincide with the surface-water drainage basin super imposed above it.

It is important to delineate a surface-water drainage basin in any study of the water budget of an area, the impact of some activity that might affect quality or quantity of water in a basin, or the potential development of water resources in a basin.

Topography determines the boundaries of a surface-water drainage basin. Therefore, a topographic map can be used to make a first approximation of the basin boundaries. (Ideally, any drainage basin map made in this way should be field-checked.) Follow these steps (fig. 3.7):

1. For a stream’s drainage basin, find the point where the stream enters another body of water (its “base level”).

2. Put a pencil tip at the base level, and then move it, intersecting contour lines at the right angles, to the topographically highest nearby location.

3. Continue in this fashion. The goal is to draw a line surrounding the area on which rainfall would drain into the stream of interest. Rain falling on the other side of the line would flow into a different stream or other body of water.

4. Interpret the topographic contours this way: set a pencil point down anywhere on the map and imagine what would happen if a marble hit the ground (as shown in the map) at that point. Would it roll ultimately into the stream of interest? If so, then that point belongs in the drainage basin of that stream. If it would end up in a different stream, then it does not. If that is the case, then move the pencil closer to the stream of interest and repeat the conceptual “marble test”.

5. The point where it is unclear which way the marble would roll, because it may roll either way, is situated on the drainage divide, or boundary of the drainage basin.

It can be difficult to make an absolute determination of drainage-basin boundaries from a map alone, especially if there is a broad floodplain or if there are extensive wetlands where the stream meets the next body of water. Flat topography also can be a complicating factor, as can human-made diversions of drainage. For a more precise map, field-check the basin boundaries. Field checking the boundaries of a large basin may be impractical; it may be best simply to check the most problematic areas.
To field-check the map, again begin at the mouth of the stream. Walk uphill, initially walking along the steepest uphill path. Move slowly, at each step checking. If a “drop of rain fell to my left and ran overland to a stream, would it flow into my stream or somewhere else? What if it fell to my right?” If you are walking along the drainage divide, then the right and left sides should give different answers to this question. Look behind yourself frequently to check yourself. Survey flags may be helpful; position them at the basin boundary and periodically review them as you proceed.