1154-D5-2605   **Melanie R. King*** (`melanie-king@uiowa.edu`). *Length Space Skeletonization in 2-Dimensions.* The collapse problem in image registration is the decrease in object area to an area of nearly measure zero resulting from applying a diffeomorphism to an image. In some cases, we can detect that collapse has occurred by studying the skeletal curve of the object. In his formulation, Harry Blum offered a "grassfire analogy" as way of visualizing the reduction of area from the object boundary towards its skeleton. Set the boundary on fire and track the advancement of the fire front at uniform speed. Skeletal points are the quench points of opposing fire fronts. In order to study the collapse problem, consider an object to be a bounded 2D region G with some overlapping bounded region W. We call W an obstruction to G and so the non-overlapping region $D = \overline{G - W}$ is the unobstructed portion of G. We apply the grassfire analogy to the unobstructed boundary of D. A length skeleton is comprised of the quench points of opposing fire fronts in a uniformly advancing unobstructed boundary. We will formally define the length skeleton for two overlapping 2D regions. Moreover, we discuss some results regarding the characterization of the level sets describing area reduction and the characterization of the skeleton for specific cases of the unobstructed boundary. (Received September 17, 2019)