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The development of mathematical habits of mind is an important component in the preparation of secondary mathematics teachers. One avenue to developing mathematical habits of mind is to involve future teachers in mathematics research. Unfortunately, preservice teachers rarely receive this opportunity. The Research Experiences for Undergraduates (REU) Site for Secondary Mathematics Teachers at Illinois State University was designed in response to the national need for highly qualified mathematics teachers and the call for prospective mathematics teachers to experience mathematics research. The goals of the program are to expand the prospective and practicing mathematics teachers' views of mathematics as a dynamic endeavor, to provide opportunities for mathematical discovery, to improve their mathematical habits of mind, and to enhance their content and pedagogical content knowledge. This presentation will describe the REU program, sample research problems, components designed to develop mathematical habits of mind and to help teachers' translate their research experience to the classroom, and suggestions for implementation. In addition, data will be provided that characterizes the changes in their beliefs about mathematics as a result of experiencing mathematics research. (Received September 25, 2012)