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Enumeration of singular curves with tangency conditions.

How many nodal degree d plane curves are tangent to a given line? The celebrated Caporaso-Harris recursion formula gives a complete answer for any number of nodes, degrees, and all possible tangency conditions. In this talk, I will report my recent work on the generalization of the above problem to count singular curves with given tangency condition to a fixed smooth divisor on all smooth surfaces. I will show how Hilbert schemes of points on surfaces can be used to identify each singularity type. (Received February 09, 2013)