Title: Monoid generalizations of the Richard Thompson groups Abstract: The groups $G_{k,1}$ of Richard Thompson and Graham Higman can be generalized in a natural way to monoids, that we call $M_{k,1}$, and to inverse monoids, called $Inv_{k,1}$; this is done by simply generalizing bijections to partial functions or partial injective functions. The monoids $M_{k,1}$ have connections with circuit complexity (studied in another paper). Here we prove that $M_{k,1}$ and $Inv_{k,1}$ are congruence-simple for all k. Their Green relations J and D are characterized: $M_{k,1}$ and $Inv_{k,1}$ are J-0-simple, and they have k-1 non-zero D-classes. They are submonoids of the multiplicative part of the Cuntz algebra O_k. They are finitely generated, and their word problem over any finite generating set is in P. Their word problem is coNP-complete over certain infinite generating sets. Changes in this version: Section 4 has been thoroughly revised, and errors have been corrected; however, the main results of Section 4 do not change. Sections 1, 2, and 3 are unchanged, except for the proof of Theorem 2.3, which was incomplete; a complete proof was published in the Appendix of reference [6], and is also given here.