We report photofragmentation studies of mass-selected ICN\(^{-}\)\((\mathrm{CO}_2)_n\) \((n=0-18)\) cluster anions following 400, 500 and 600 nm excitation. Photodissociation of ICN\(^{-}\) following excitation \textit{via} a 500 nm photon results exclusively in an \(\mathrm{I}^-\) anionic photoproduct. However, excitation at either 400 nm or 600 nm results in 30\% \(\mathrm{CN}^-\) and 70\% \(\mathrm{I}^-\) anionic photoproducts. Complexation of ICN\(^{-}\) with two or more \(\mathrm{CO}_2\) molecules opens a third product channel, recombination of the chromophore on the ground state, a channel that is observable at all three photon energies. The product branching ratios for photodissociation of ICN\(^{-}\)\((\mathrm{CO}_2)_n\) show sharp contrast to trends previously observed in dihalide studies of IB\(^{+}\)\((\mathrm{CO}_2)_n\) and IB\(^{+}\)\((\mathrm{CO}_2)_n\), but are strikingly similar to results found for ICl\(^{-}\)\((\mathrm{CO}_2)_n\). Notably, a peak in the percentage of recombined photoproducts observed as a function of the number of solvent molecules shifts to larger \(n\) values as photon energy increases and does not reach 100\% in the first solvation shell. It is likely that an intracluster reaction involving formation of the molecule NCCO\(_2\)\(^{+}\) plays a significant role in the dynamics observed following excitation of the ICN\(^{-}\)\((\mathrm{CO}_2)_n\) anion. Supported by NSF and AFOSR.