An automated multisample processing flow injection (FI) system was developed for simultaneous determination of technetium, neptunium, plutonium, and uranium in large volume (200 L) seawater. Ferrous hydroxide coprecipitation was used for the preliminary sample treatment providing the merit of simultaneous preconcentration of all target radionuclides. Technetium was separated from the actinides via valence control of technetium (as Tc(VII)) in a ferric hydroxide coprecipitation. A novel preseparation protocol between uranium and neptunium/plutonium fractions was developed based on the observation of nearly quantitative dissolution of uranium in 6 mol/L sodium hydroxide solution. Automated extraction (TEVA for technetium and UTEVA for uranium) and anion exchange (AGMP-1 M for plutonium and neptunium) chromatographic separations were performed for further purification of each analyte within the FI system where four samples were processed in parallel. Analytical results indicate that the proposed method is robust and straightforward, providing chemical yields of 50-70% and improved sample throughput (3-4 d/sample). Detection limits were 8 mBq/m(3) (0.013 pg/L), 0.26 mu Bq/m(3) (0.010 fg/L), 23 mu Bq/m(3) (0.010 fg/L), 84 mu Bq/m(3) (0.010 fg/L) and 0.6 mBq/m(3) (0.048 ng/L) for Tc-99, Np-237, Pu-239, Pu-240 and U-238 for 200 L seawater, respectively. The unique feature of multiradionuclide and multisample simultaneous processing vitalizes the developed method as a powerful tool in obtaining reliable data with reduced analytical cost in both radioecology studies and nuclear emergency preparedness.