The Island Ironwood, Lyonothamnus floribundus is a paleoendemic tree found only on 4 of the 8 California Channel Islands. Fossil evidence, however, indicates they were widespread on the mainland in the Miocene (16 million years ago). Two subspecies of ironwood are characterized by differences in leaf structure, ssp. aspleniifolius or the "fern leaf ironwood" is native to Santa Cruz, Santa Rosa and San Clemente islands and, ssp. floribundus, is native only to Santa Catalina Island. We are currently using molecular methods to investigate genetic diversity of this species.

Our initial studies on ironwood groves on Santa Cruz Island indicated that most groves, containing from a few to more than 100 trunks, were clonal, that is, were derived from one genetic individual. Each grove was distinct, but the trees within a grove were genetically identical. For years botanists have noted that, despite abundant flowers, the trees appear to reproduce solely by root sprouting. Seeds and seedlings are rare on the islands. Groups of ironwoods in cultivation on the mainland, however, produce abundant seeds and we have demonstrated that each of these trees is genetically distinct. These observations suggest that extensive clonality in this species on the islands may have reduced the out crossing needed for seed production and that that number of genetically distinct individuals in nature may be far less than the number of trunks.

We are currently investigating clonality and genetic diversity of the ironwoods on Santa Catalina Island. We have collected leaf material from multiple trees in groves representing all the geographic regions on the island and are currently using amplified restriction length polymorphism (AFLP) to analyze the DNA. This method is based on the polymerase chain reaction (PCR) and allows us to rapidly survey many regions of the DNA for differences. Clonal trees will be expected to have identical DNA sequences and therefore will not show differences in this sampling method. Genetically distinct individuals, on the other hand, will have unique sequences and these will appear as differences in the ALFP patterns. The results obtained with the trees on Santa Catalina Island will then be compared with the results from the other 3 island populations to estimate the total diversity of this species remaining in the wild and whether the patterns of diversity can give us clues to the time of the origin and the relationships between these
island populations.