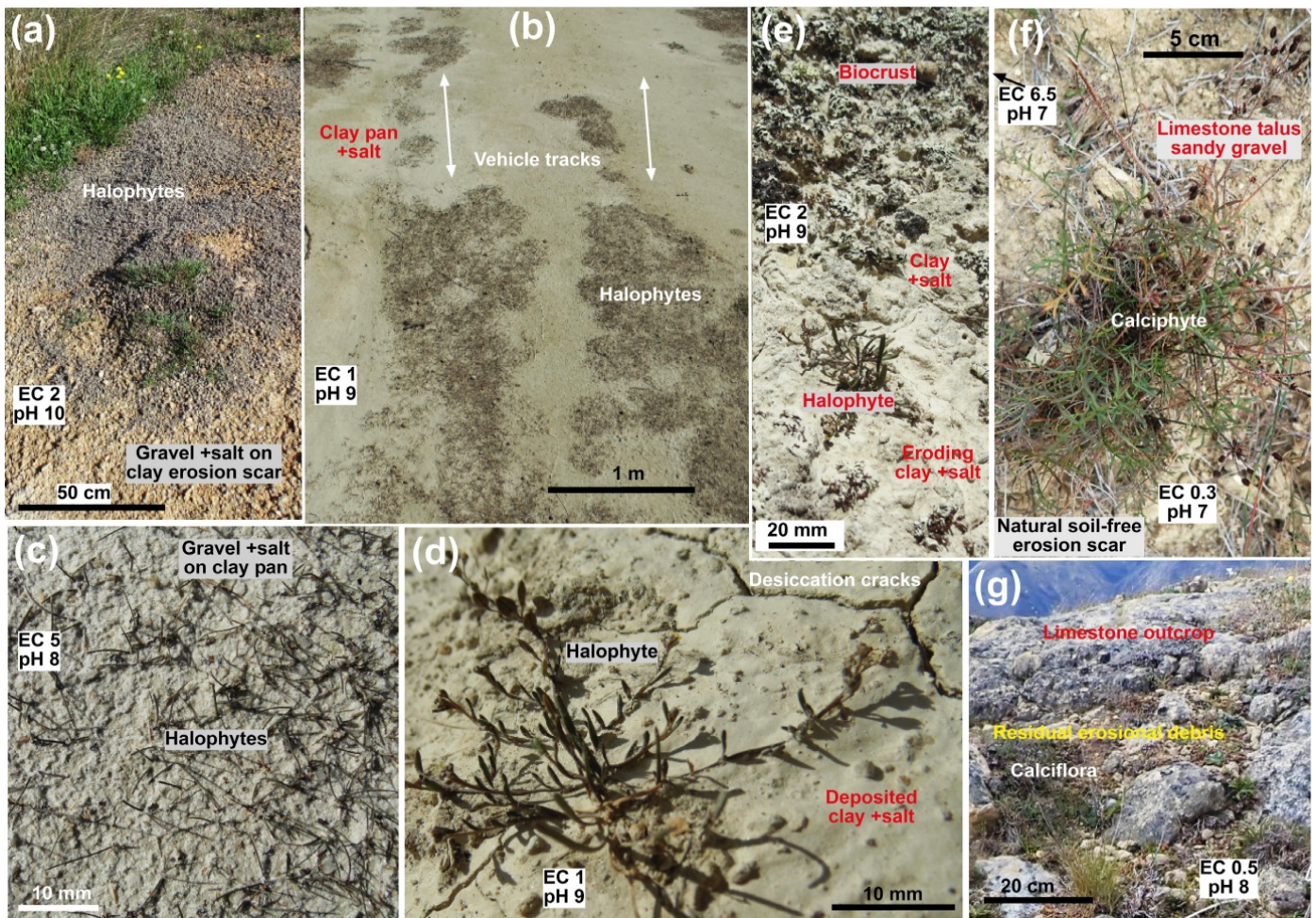


Enhancement of alkaline saline soil-free bare substrates and specialist ecosystems, southern New Zealand

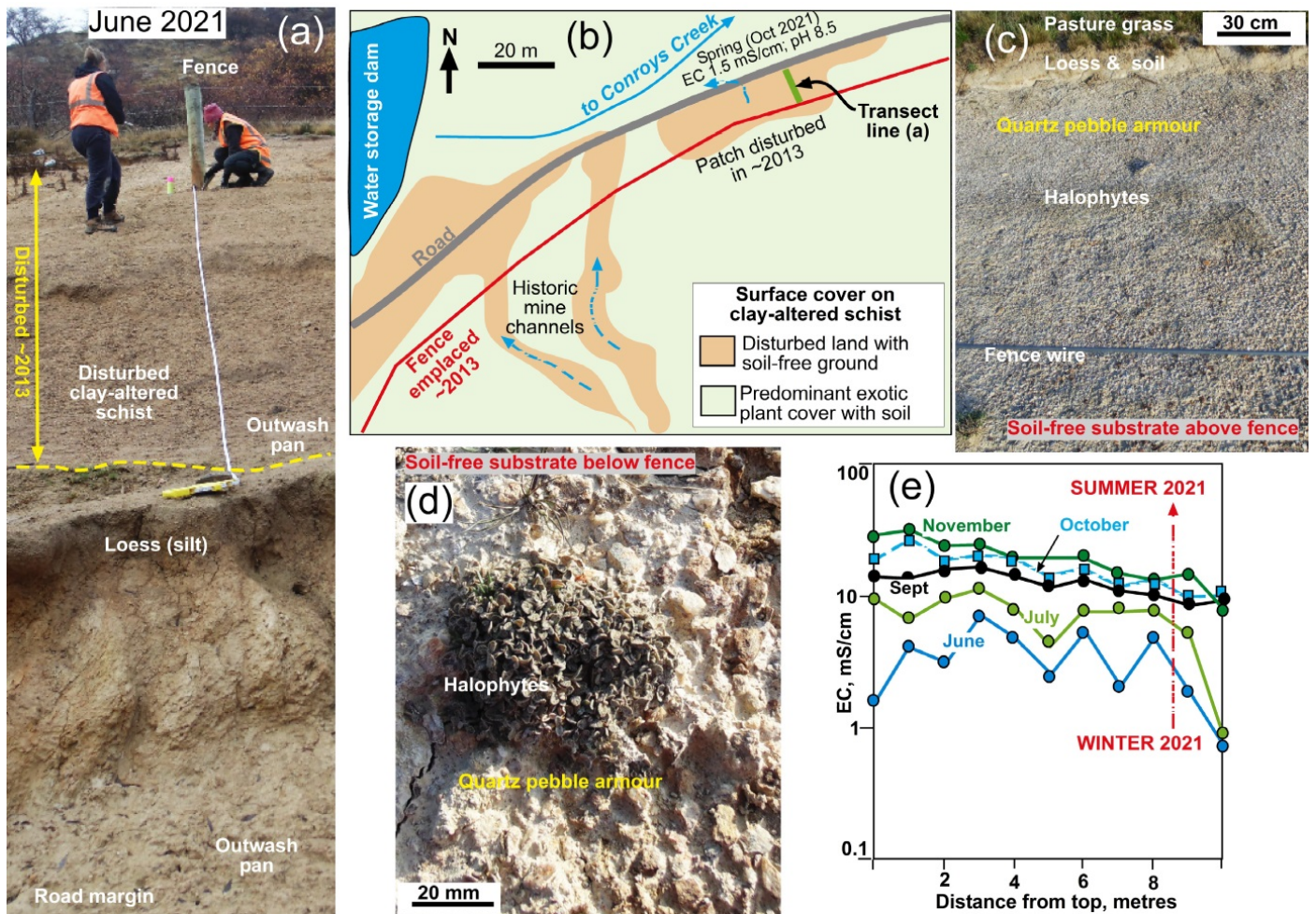
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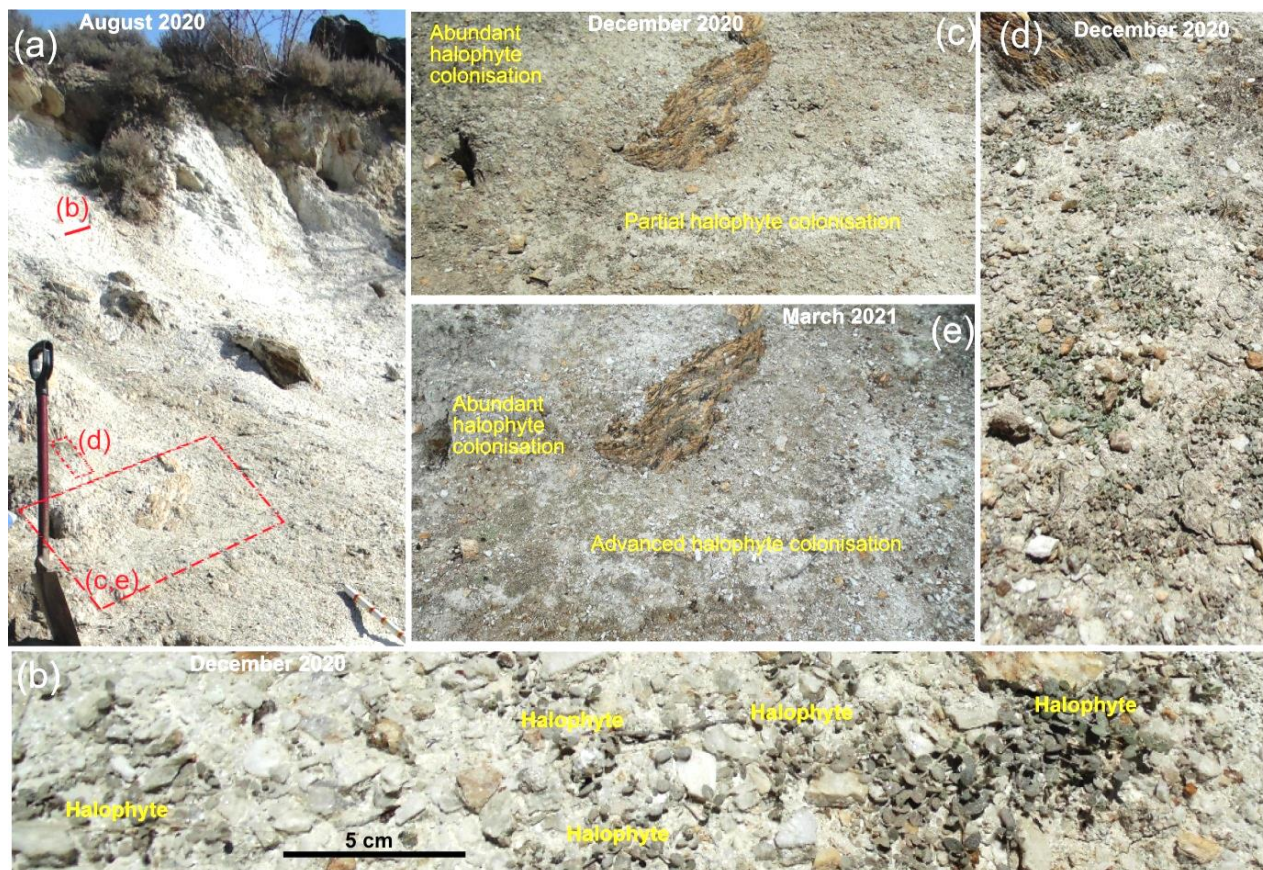
Supplementary Figures



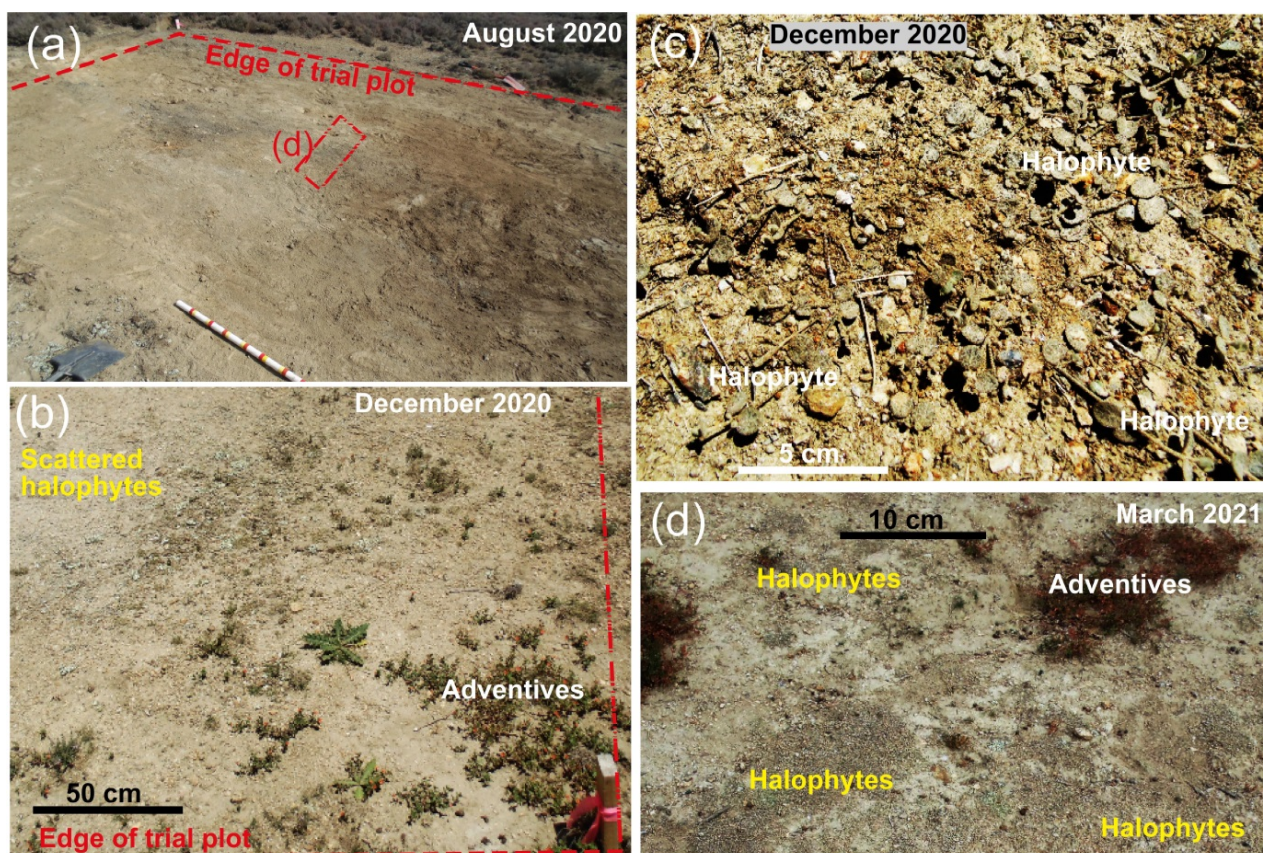
Supplementary Figure 1. Field photographs to show the dynamic bare substrate environments inhabited by halophytes and calciflora. Generalised substrate salinities (EC in mS/cm) and pH are indicated. (a) Eroding scarp of saline (NaCl) clay-altered basement schist with halophytes (*A. buehnerii*) at Galloway site (Fig. 1c). (b) Halophytes (*P. raroflorens*) established preferentially on vehicle tracks on a halite-covered clay pan. (c) Halophytes (*P. raroflorens*) growing in an actively developing erosional pan with halite (white). (d) Halophyte (*Lepidium kirkii*) emerging from an outwash of recently-deposited (<1 month) salt-bearing (NaCl) clay pan. (e) Halophytes (*Lepidium kirkii*) growing from an eroding salty (NaCl) clay slope, locally stabilised by biocrust. (f) Calciphyte (*Chaerophyllum basicola*) growing in an erosional scar in limestone-sourced talus. (g) Limestone outcrop with calciflora growing in erosional debris that has accumulated in solution cavities.



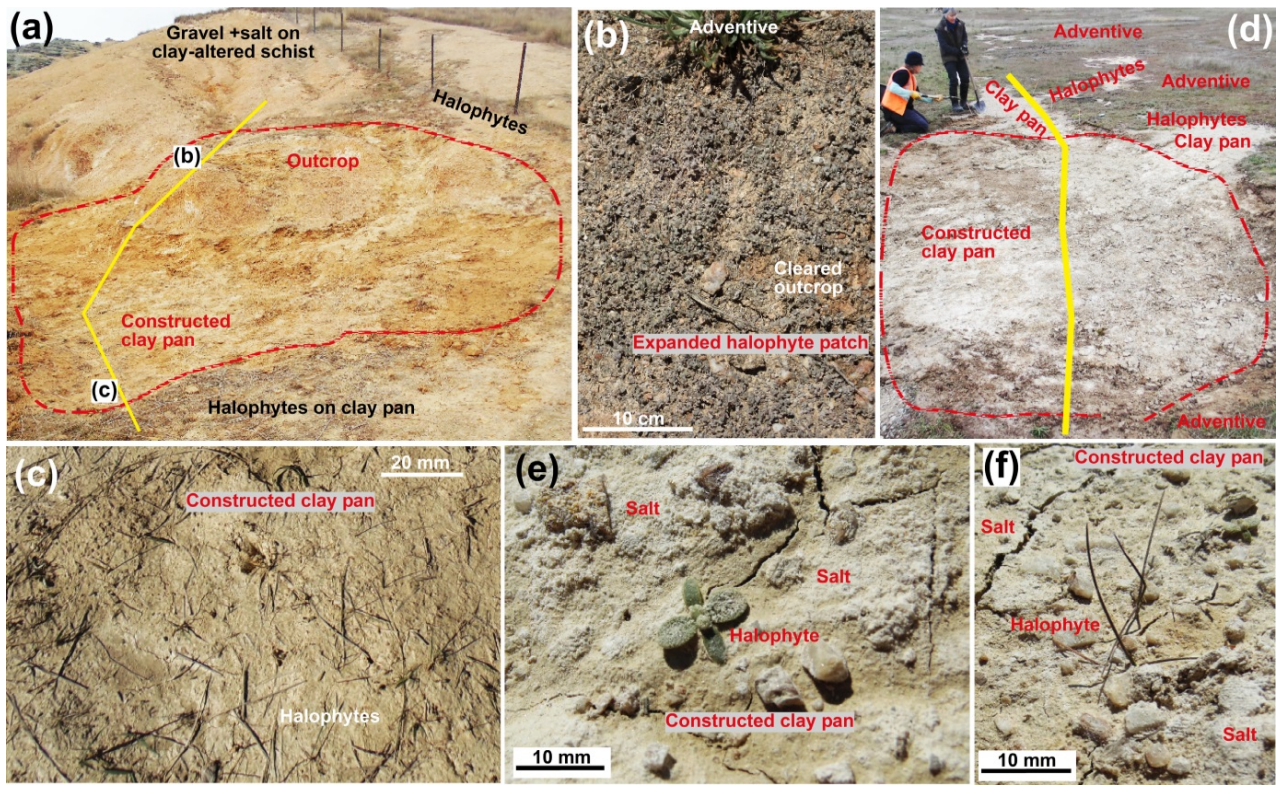
Supplementary Figure 2. Conroy multiyear soil removal site along a fence line constructed in ~2013. (a) Soil-free zone below the fence, with a transect established to measure seasonal EC and pH variations. (b) Sketch map of the site. (c) Photograph of soil-free zone above fence, showing colonising halophytes (*A. buchananii*) as a nearby source population for in a. (d) Photograph of halophyte (*A. buchananii*) and substrate below the fence. (e) EC variations over time for the transect depicted in a & b (as in Fig. 3d).



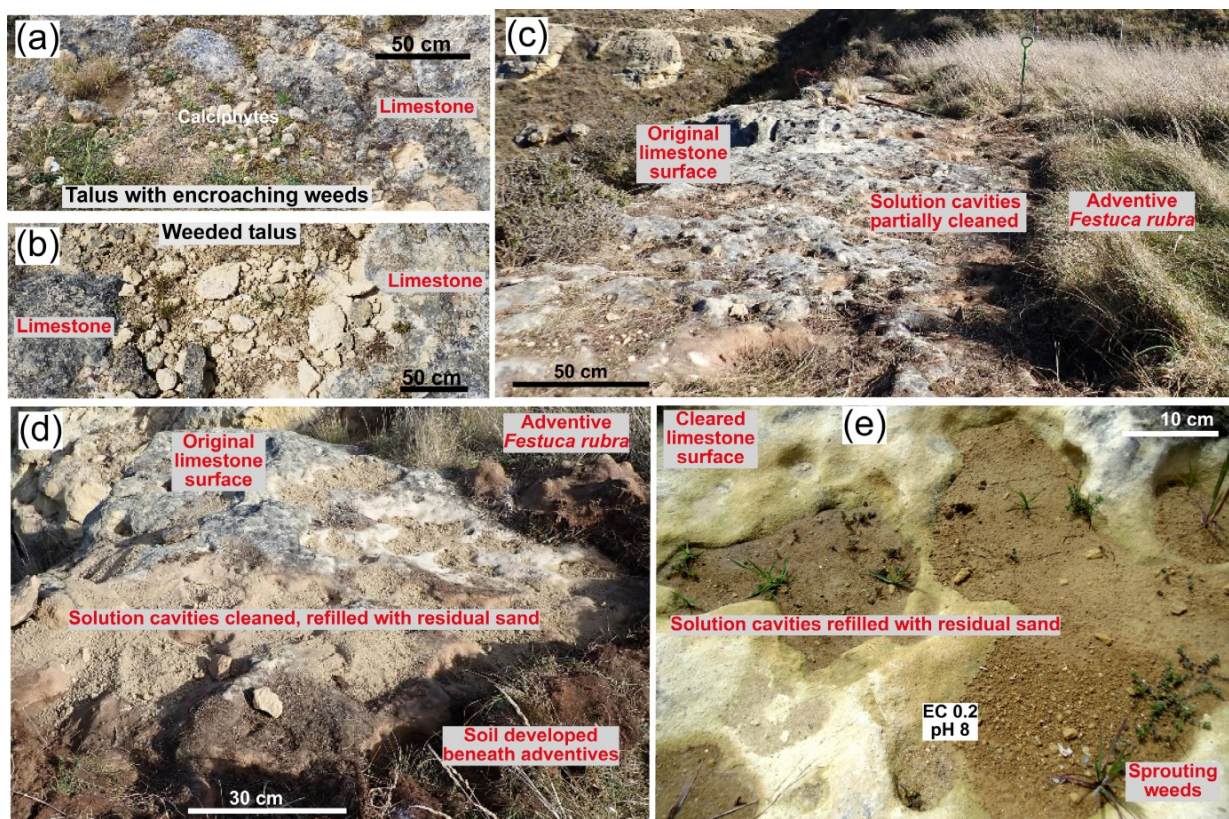
Supplementary Figure 3. Successful rapid halophyte colonisation of the white clay Chapman Road site (Fig. 4a). (a) Photo of upper part of the site when first established. (b-d) Halophytes established in December 2020 (positions indicated in a). (e) Same area as in c, with more extensive halophyte colonisation by March 2021.



Supplementary Figure 4. Photographs of halophyte colonisation at the brown Chapman Road site (Fig. 4b). (a) A portion of the site as developed in August 2020. (b, c) Incipient halophyte colonisation in December 2020. (d) Well-established halophytes within the site (as in a) in March 2021.



Supplementary Figure 5. Development and evolution of soil removal sites at Galloway and Crawford localities, with monitoring transect lines (yellow in a and d). (a) Galloway soil removal site as it was initially developed in May 2021. (b) Expansion of halophytes (*A. buchananii*) on to cleared substrate near the top of the trial site, in December 2021. (c) Incipient growth of halophytes (*P. raroflorens*) on constructed clay pan at base of Galloway site in September 2021. (d) Crawford soil removal site as it was initially developed in June 2021. (e-f) Incipient growth of halophytes on constructed clay pan at Crawford site in September 2021, with abundant fresh salt encrustations.



Supplementary Figure 6. Field photos of Cenozoic limestone near Kurow and rare calciflora ecostem. (a) Typical limestone outcrops and talus with calciflora and encroaching weeds. (b) Talus-filled depression in limestone that has undergone deep weeding. (c,d) Calciflora previously established in soil-poor debris-filled solution cavities had been displaced by adventive species, around which substantial soil had developed. (e) Surface of soil removal area, with depressions backfilled with sandy talus, observed after 6 months. No calciflora had established, but the bare ground was maintained and only minor weeds were sprouting (as in Fig. 2f).