ESSAYS

in honor of

CLIFFORD M. ZIERER
# ESSAYS IN HONOR OF CLIFFORD M. ZIERER

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Forty years of continued association is really more than sufficient time in which to make an imprint on a university department of geography. But when done with the quiet touch the manifestations of the imprint are subtle and deeply imbedded, and they are not at all obvious to the casual view. Clifford Maynard Zierer came to a freshly reorganized Department of Geography at UCLA in September, 1925, as its youngest instructor, to teach physical and economic geography with North America as the regional stage on which to construct his systems of man living in a living but changing environment. He retired from active duty in June, 1965, as a senior professor who had spent his whole academic life in the department at UCLA. He retired a respected and skillful practitioner who had originated a good many of the courses in the current catalogue, who had in committee faced almost every kind of academic problem, who had as Chairman at a critical juncture urged the directions and patterns of growth which shaped the present UCLA department, and who as an ex-chairman had cooperated fully with the continuing growing elements of the program.

And yet it is somewhat difficult to label pieces of the structure, sectors of the program, graduates of the department, or segments of geography, at UCLA, as being those constructed by Zierer, alone. The unobtrusive and simple suggestion, the calm and measured consideration, the refusal to go overboard in any direction, the denial of the dogmatic creed, the quiet acceptance of change and growth, the repeated initiation of courses later turned over to other instructors, the insistence that there were many approaches to geography, the reserved but insistent demand for excellence, and the progression of his own interests through field after field marked those four decades, and they provided a singular element of continuity to the department. As an undergraduate student in Zierer's classes in those first years, and as a junior colleague for more than half the period, it has been my privilege to watch the application of the skillful but quiet touch in the unobtrusive manner.

An urban geographer by his own graduate training (PhD., Chicago, 1925), Clifford Zierer had come out of a rural background, and everything was grist to the mill, from the agricultural scene to the growing urban complex. A graduate training which focused upon the contemporary scene made his early California interests full of the here and now. These interests were pressed by the rapid change in the California scene, but the vital concerns gradually deepened into a concentration upon the issues of historical change in the landscapes of North America. The necessities of shaping new courses in a growing department found the undogmatic outlook amenable, but they prevented the specialization upon any particular field of research, even though Zierer has been professionally labeled an Australian regionalist by many. In initiating the first field course, the course in conservation, courses in advanced economic geography, a wide variety of graduate seminars, and the first courses in an American department on

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1 His doctoral dissertation dealt with *The Industrial Geography of Scranton.*
2 He traveled to Australia, New Zealand, and several islands in Oceania, in 1938.
Australia offered by an American geographer on the basis of personal field research, Zierer built elements of his own geographical outlook into the permanent structure of the departmental program. Although these have been overlaid by later structural elements his contributions remain fundamental building blocks. Other elements of his impact bear little visible mark of the individual to present day students. Such are one of the best collections of geographical journals available to any group of university geographers, and the widely ranging holdings of the university research library.

Zierer's role in the training of advanced undergraduate and graduate students often was not strikingly noticeable, so quietly was it performed. The refusal of the fixed creed, the variety of his own interests, the changing focus of his concerns, and the insistence that "there are many ways to skin a cat" has not produced a corps of younger geographers clearly branded with a single label. Yet few students who shared in office discussions of widely ranging subjects, who came into his undergraduate courses and graduate seminars, or who had the benefit of his committee membership for thesis or dissertation remained unaffected by his views. Seminars for years met in his own home in an upstairs library work room crowded with books, almost any of which would be hauled out onto the big work table for aid in settling an issue. The quiet insistence upon critical consideration of issues never was matched by the advocacy of particular doctrines laid down for acceptance by the students involved. Zierer's own research and his own doctrinal views often seemed a private affair, even hard to draw from him. His own continuing research seldom was discussed as such, and sometimes was not even known about until a publication appeared, yet each study was a planned part of his own program of increased understanding, fitted somewhere into his formal or informal teaching. His own casual comment that he fell into the department at an opportune time belies the effective ways in which he made the most of the opportunities. Students who took seminars from, or worked under, Zierer have ranged widely through most of the fields of knowledge which interested him, and in a modest assemblage of the sort here presented it would be impossible to reflect the full range of his own interests.

Zierer's publications, by title, do not reflect his concern for historical change, but close reading of many of them will disclose that concern. His on-going research of recent years is not well indicated in the bibliography because it has been long-range in extent, widespread in regional coverage, and not completed at this point, but in the freedom of retirement his wide-ranging curiosity about the changing face of North America keeps him even busier than before. We look forward to some interesting studies as the fruits of mature scholarship.

J. E. SPENCER

University of California,  
Los Angeles.
An Editorial Note

All of the seven invited papers comprising this *festschrift* reflect in different ways the inspiration of Professor Zierer. And, fortuitously, their contributors span the four decades Professor Zierer held forth at UCLA. Each contributor was encouraged to present a study, one that would be in topic or region kindred to studies directed or influenced by Professor Zierer. Because the doctoral program in geography began only in the post-war period, most of Professor Zierer’s earlier students went on to earn advanced degrees at other institutions. Not all of the authors herein were supervised by him in their graduate studies.

Spencer, as a former student and contemporary colleague, was the logical choice to essay the introductory perspective. Friis, a long-standing student of cartographic archives, provides a cogent example of a kindred interest shared by Professor Zierer—the historical cartography of the United States. Both contributors were students in the first decade. Anglo-America—more especially Southern California—, about which Zierer wrote in several veins, is represented in four papers. Gregor examines the cotton plantation, Durrenberger reviews the historical geography of the lemon industry, Steiner analyzes the relationships between urbanization and open space, and Mazzucchelli reassesses the delimitation of the Mohave Desert. Fielding’s evaluation of rural development in New Zealand rounds out the *festschrift* with a study taken from field research in a part of Oceania. All of these contributors were students in the two post-war decades.

As an idea, this *festschrift* was proposed to the UCLA Geography Department two years ago when Professor Zierer’s retirement was only a few months away. Clifford MacFadden, then chairman of the department, circulated an inquiry among the faculty who immediately encouraged the venture. Howard Gregor and Joseph Spencer provided editorial advice from time to time. Because of the prior commitments and busy workloads of its contributors, publication was held up a year; moreover, such circumstances precluded the addition of several essays by former students, who, in lieu of representation herein, share in the spirit of this *festschrift*. Grateful thanks are expressed to the California Council of Geography Teachers and Robert A. Kennelly, editor of *The California Geographer*, for graciously undertaking publication, and to Professor Zierer’s many colleagues and students for defraying all necessary costs.

Imre Sutton

California State College
Fullerton
The Major Publications of Clifford M. Ziere

ARTICLES


"Scranton's Industrial Integrity," *Economic Geography*, 5 (January, 1929), pp. 70-86.


"The Industrial Area of Newcastle, Australia," *Economic Geography*, 17 (January, 1941), pp. 31-49.


Confidential Geographical Reports on *Australia and the Southwest Pacific Islands* to the Secretary of War, 1941-1942. Approximately 1500 pages of unpublished manuscript with maps and photographs.


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Selective Reviews and Abstracts of the Works of Others


Books

*California and the Southwest*, (John Wiley and Sons, 1956), 376 pp. Organizer, contributor and editor.

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Herman R. Friis**
Director, Center for Polar Archives
The Natural Archives, Washington, D.C.

During the latter half of the eighteenth century geographical exploration of Western North America advanced at a rapid pace and led to a surprising fund of knowledge, some of which has only recently come to light. England, France, Spain and Russia were the principal participants in the drama, the main themes of which were the search for the Northwest and Northeast Passages to the Orient and for the vast riches thought to exist. By the end of the century the advances on all fronts had proved rather conclusively that the North American Continent was indeed a tremendous land mass, a barrier to a direct water route to Asia, though perhaps through it there might be found that conveniently located waterway making transcontinental passage possible. To those who wanted to believe, there appeared to be sufficient proof that the several wide water entrances (e.g., Puget Sound, Columbia River, and San Francisco Bay) led far inland to meet with the rivers, such as the Missouri, draining eastward across the Great Plains and into the Mississippi.  

* Most of the sources used in the preparation of this paper are in the official records of the Federal government in the National Archives in Washington, D.C. The official designation of the principal Record Groups to which they belong are Records of the Office of the Chief of Engineers (RG77) and Records of the Office of the Secretary of War (RG107). When cited hereafter the designation will be simply RG77 and RG107 respectively with appropriate subgroup and series description for each specific citation.

** Mr. Friis earned his B.A. degree from UCLA in 1931.

Although Thomas Jefferson and other philosophers, naturalists, and politicians in the United States were well aware of the tremendous potential value of the expanse of North America west of the Mississippi River, it was not until 1803 that Jefferson as President of the United States asserted this interest in tangible form. In January 1803 Jefferson's report to Congress revealed his primary geographical interest in the West and requested approval to send an exploring expedition toward the Pacific Ocean, ostensibly to trade with the Indians. News of the purchase of Louisiana from France on July 1 of that year changed the complexion and, to some extent, the objectives of his Meriwether Lewis and William Clark Expedition, which between 1803 and 1806 transected the area between the Mississippi River and the Pacific Coast, our first official scientific geographical exploring expedition. Well aware of the importance of having firsthand geographical information about the extensive "plains" area that bisected the continent north-south between the Mississippi River and the Rocky (or Stoney) Mountains, Jefferson dispatched a succession of explor-


4 For the "Confidential" manuscript original see Original Messages from the Presidents, 7th Congress, 2nd Session, House of Representatives RG233, 4 pp., in the National Archives, Washington, D.C. For published versions (apparently not accurate transcriptions) see Reuben G. Thwaites, Original Journals of the Lewis and Clark Expedition, 1804-1806; Printed from the Original Manuscripts in the Library of the American Philosophical Society and by Direction of its Committee on Historical Documents, ..., (New York, Dodd, Mead Co., 1904-1905), 8 vols., Vol. 7, pp. 206-208; and American State Papers, Indian Affairs, Vol. 1, pp. 684-685, (Washington, Gales & Seaton, 1832-61).


ing expeditions during the period 1803-1806. Jefferson also had the rare good fortune of visits with the eminent Prussian geographer, Alexander von Humboldt, in the White House (then the President’s House) in Washington during which he was briefed by him on the geographical intelligence of Spanish America. These were the beginnings of a kind of centralized government geographical intelligence bureau on the American West. Unfortunately, as quickly as these systematically-planned projects began, so indeed they quickly closed out by 1807. Of course, it is true that variant forms of intelligence about the West trickled into the official depositories in Washington. With Jefferson’s official passing from the Washington scene, the Federal government had relatively few far-seeing officials who recognized the country’s “Manifest Destiny” west of the Mississippi River, that is, until John C. Calhoun became Secretary of War in 1817 and James Monroe was President of the United States (1817-1825).

On March 15, 1817, Major Stephen Harriman Long, who had been employed as a topographical engineer in the northwestern part of the United States during the preceding season, was in Washington. From his hotel he wrote a letter to President Monroe. In his letter he noted that

“I would build a small Steam Boat about 40 feet in length and 7 feet Beam, drawing no more than 14 inches of water. With this I would navigate all the rivers of consequence falling into the Mississippi, meander their courses, and take the Latitude and Longitude of their mouths, and heads of Navigations. I would then ascend the Illinois and pass into the Lakes with

Simultaneously with the Lewis and Clark Expedition Jefferson dispatched other expeditions into the region west of the Mississippi Valley, to explore especially the riverways westward to their headwaters. For excellent references to these see in John F. McDermott (ed.), “The Western Journals of Dr. George Hunter, 1796-1805,” Amer. Philos. Soc., Trans., Vol. 53, 4 (1963), pp. 1-133. In addition to Hunter there were surveys by William Dunbar (with Hunter), John Sibley and Zebulon Montgomery Pike. Of these, Pike’s exploration of the Mississippi River to its source in 1804-1805 and to the American Southwest in 1805-1806 was perhaps the most important. For a scholarly definitive work on Pike, see Donald D. Jackson, The Journals of Zebulon Montgomery Pike (Norman, Univ. Of Oklahoma Press), 2 vols.

For a good general overview of these expeditions see [Thomas Jefferson], Message from the President of the United States Communicating Discoveries Made in Exploring the Missouri, Red River, and Washita, by Captains Lewis and Clark . . . Feb. 19, 1806, . . . Printed by Order of the Senate, Washington, (1806), 178 pp. For the original see in Records of the United States Senate, RG46, in the National Archives in Washington, D.C.


See especially in the Records of the Office of the Chief of Engineers (RG77) and Records of the Office of the Secretary of War (RG107) in the National Archives in Washington, D.C.
my Boat, which may be easily done in time of high water. I would reconnoiter the coasts of the Lakes, explore the waters falling into them, and take the Latitude and Longitude of all important places. By these means, the courses and relative positions of the rivers may be ascertained, and a correct Plan of the country may be made, with less trouble and expense, probably than by any other method that would be devised."

Long's cursory topographical surveys of the Missouri-Mississippi waterways in 1817 convinced him of the need of a scientific approach to establishing a network of astronomical and geodetic observations, describing the environment, and mapping the terrain. Late in 1817 Major Long was directed by Secretary of War John C. Calhoun to organize and command an expedition which was to

"... explore the country between the Mississippi and the Rocky Mountains ..."

"... explore the Missouri and its principal branches, and then in succession, Red River, Arkansas, and Mississippi, above the mouth of the Missouri ...

This expedition was popularly referred to as the "Yellowstone Expedition." A military force, under Colonel Henry Atkinson, was to accompany the scientific force which was commanded by Major Long.

Long's earlier explorations, his topographical know-how, and his confidence in the steamboat for river travel were a substantial background for adequate planning. During the winter 1818-1819 Long selected his military assistants, his scientists, and his crew. He also prepared the design and specifications of his steamboat the "Western Engineer," which was built in the boat yards in Pittsburgh. Long and his military assistants, Cadet William H. Swift and Lieutenant James D. Graham, visited the best instrument-makers and military stores in the East in search of the most reliable instruments available. Long also built up a library of books.

10 Part of letter from Major Stephen H. Long to James Monroe, dated Washington Hotel, March 15, 1817, in Letters Received, L-46(10), RG 107.
12 These orders are published in Edwin James (comp.): Account of an expedition from Pittsburgh to the Rocky Mountains, performed in the years 1819 and '20, by order of the Hon. J. C. Calhoun, sec'y of war; under the command of Major Stephen H. Long. From the notes of Major Long, Mr. T. Say, and other gentlemen of the exploring party. Comp. by Edwin James, botanist and geologist of the expedition ... (Philadelphia, Carey & Lea, 1823), 2 vols. and atlas, Vol. I, Preliminary Notice, p. 3.
14 See for example "Return of Books and Instruments in the Possession of Major S. H. Long, U. S. Engineer, Jan. 1, 1820" in Monthly Reports from Officers, 1820-1830, RG77, 5 pp. Most of the forty-three publications he lists concern exploration of North America and astronomical and geodetic observations and surveying. He lists twenty-three different instruments such as measuring tapes, thermometers, chronometers, theodolites, sextants and artificial horizons. All of these items probably were at that time aboard the "Western Engineer" or in Long's quarters in the cantonment at Council Bluffs and were essential to the geographical work of the Expedition.
and scientific publications that would be of value to him and his colleagues. 14

THE EXPLORING EXPEDITION: 1819-1820

The route and the composition of the area covered by the Expedition are rather well-known and have been described and discussed in several fundamental recent publications. 15

On May 3, 1819, the Exploring Expedition commanded by Long departed Pittsburgh in Long's specially designed and constructed steamboat, the "Western Engineer." Progress of the "Western Engineer" down the Ohio to its confluence with the Mississippi up the Mississippi to St. Louis and then up the Missouri to Council Bluffs proved to most authorities that the steamboat as a river craft in low water was definitely not the vehicle for the expedition's movement of cargo and troops. 16 The scientists complained bitterly about the infrequency with which they were permitted to carry out land surveys and scientific exploration. 17 Doctor William Baldwin, botanist on the Expedition, died on August 31 (or September 1). 18

The Expedition reached the camp of the United States troops near Council Bluffs on September 19, and constructed a winter quarters nearby, which was named "Engineer Cantonment." 19 On October 11, Major Long, Major Biddle, and Mr. Jessup

"... took leave of their friends at Engineer Cantonment, and, accompanied by several other person, descended the Missouri in a canoe, on their way toward Washington and Philadelphia ..." 20

Before his departure Long issued orders to the resident "scientific staff," covering the work that was to be accomplished during the winter. 21 This resident staff was perhaps the first official United States Government professional corps to establish a scientific station and to conduct sys-

15 Official reports and letters were sent to his superiors in the War Department by Long during the course of his voyage to Council Bluffs, often as progress reports. See for example his letters to Secretary of War John C. Calhoun dated Pittsburgh April 20, 1819, June 25, 1819, July 19, 1819, and October 28, 1819 in Letters Received, RG107. For the official published account see Edwin James (comp.): op. cit. [see footnote 12]; the London edition 1823 is reprinted by Reuben G. Thwaites (ed.), Early Western Travels ... op. cit. [see footnote 1].

16 See for example a copy of J. D. Graham's letter to S. H. Long dated Engineer Cantonment Nov. 20, 1819 with S. H. Long's letter to the Secretary of War dated Washington Jan. 22, 1820 in Letters Received, L-59 (13), RG107, 6 pp.

17 See in letter from W. Baldwin to William Darlington, dated Franklin (Missouri Territory) July 22, 1819, in William Darlington (comp.), Reliquiae Baldwianae: ... , Phila, Pa., 346 pp., see pp. 320-321. This was Baldwin's last letter to Darlington.

18 Ibid., p. 321.

19 Reuben G. Thwaites, Early Western Travels ... , op. cit. [see footnote 1], Vol. 14, p. 221 for the official record by Edwin James.

20 Ibid., pp.249-250 for the official record by Edwin James.

21 i.e., Thomas Say, zoologist; Titian Ramsay Peale, assistant naturalist and artist; Samuel Seymour, landscape painter; nd Lieutenant James D. Graham and Cadet William H. Swift, assistant topographers. Ibid., pp. 248-249.
On January 3, 1820, Long sent a comprehensive report of the accomplishments of the Expedition to the Secretary of War. In it he recognized the deficiencies of the steamboat, recommends its return to duty on the lower Missouri and the Ohio and Mississippi Rivers, described the scientific accomplishments of his professional staff, and proposes that the Expedition explore overland from Council Bluff to the Rocky Mountains in 1820.

During Long's stay in the East he conferred and corresponded with his superiors about the changes in the purpose and objectives of his Expedition, obtained new equipment and instruments, and requested and was given additional funds. He was granted the services of Lieutenant John R. Bell of West Point to replace Major Biddle as official journalist, and Dr. Edwin James to take the place of the late William Baldwin. He also devised various forms and texts to be used in recording Indian vocabularies and scientific data.

Long, Bell, and James left Washington early in the spring of 1820, passed through St. Louis in late April, travelled overland and arrived at Engineer Cantonment on May 28. On June 6, the Expedition, with additional personnel, left the Cantonment and headed west overland to ascend the Platte River to its source, to explore the plains and the headwaters of the rivers at the base of the Rocky Mountains, and to return to the Mississippi River at about Cape Girardeau (Missouri) by the Arkansas and Red Rivers. The details of the day-to-day accomplishments of the Expedition are given in the final publication by Edwin James, and in the very recent publication of the long-lost journal of Captain Bell.

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22 For this change of original plans see in letter from S. H. Long to the Secretary of War, dated St. Louis, October 28, 1819 in Letters Received, L139 (13), RG107, 2 pp.

23 Report from Major Stephen H. Long to the Secretary of War, dated Washington, January 3, 1820 in Letter Received, L-55 (13), RG107, 10pp.

24 See especially letter and enclosures from Major S. H. Long to the Secretary of War, dated Philadelphia, Feb. 8, 1820 in Letter Received, L-74 (13) and L-78 (13), RG107, and letter from the Secretary of War to Major S. H. Long, dated Washington, Feb. 29, 1820 in Register of Letters Sent, RG107, 2 pp. and July 22, 1820 in Register of Letters Sent, RG107, 1 p.

25 For an account of his trip to and arrival at Council Bluffs and his plans for the expedition see letter from Major S. H. Long to the Secretary of War, dated Engineer Cantonment, June 2, 1820 in Letter Received, L-11, RG107.

26 There are several editions of the work by James. For the first American edition in 1823 see op. cit. See footnote 12. A somewhat modified form in three volumes was published in London in 1823, and is the edition reproduced by Reuben G. Thwaites in his Early Western Travels . . . , op. cit. [see footnote 1].

The professional members of the Expedition returned to Cape Gibar-deau on October 12 with a variety of scientific information,28 such as astronomical observations, topographical surveys, collections of and notes on a large number of specimens in natural science, information on the linguistics, manners, and customs of the Indians, and some rather severe and negative impressions of the terrain indentified on Long's map as "Great Desert"29. Unfortunately, three soldiers of Captain Bell's party deserted on the headwaters of the Verdegis River and took with them three horses and a variety of items including especially some of the official records of the professional staff.

Early in November the Expedition was disbanded, Major Long and Captain Bell went directly overland to Washington City; Say, Peale, Seymour and Lieutenant Graham departed down-river to New Orleans and then on to Philadelphia by boat; and Lieutenant Swift and Dr. James ascended the Ohio river a short distance in the "Western Engineer," James finally returning to the East from Golconda, Illinois, by horseback.

Following his return to Philadelphia and Washington, Long corresponded with and about his professional colleagues on the Expedition,30 attended to the appropriate disposition of the "Western Engineer," ar-

28 See especially appendices, tables, notes in Edwin James, op. cit. [see footnote 12].

29 For an excellent scholarly account of the history of the geographical meaning of the reference "The Great Desert" and "The Great Plains" see G. Malcolm Lewis, "William Gilpin and the Concept of the Great Plains Region," *Annals Assoc. Amer. Geogr.*, Vol. 56, 1 (1966), pp. 33-51. See also his "Three Centuries of Desert Concepts of the Cis-Rocky Mountain West," *Journ. of the West*, Vol. 4, (1965), pp. 457-468, and "Changing Emphasis in the Description of the Natural Environment of the American Great Plains Area," *Trans. and Papers Inst. British Geogr.*, Vol. 30, (1962), pp. 75-90; and R. C. Morris, "The Notion of a Great American Desert East of the Rockies," *Miss Valley Hist. Rev.*, Vol. 13, (1927), pp. 190-200. Neither Long nor James was favorably impressed with the so-called "Great Plains" as an environment for habitable settlement by man. Long noted that "... I do not hesitate in giving the opinion that it is almost wholly unfit for cultivation, ... This region, however, viewed as a frontier, may prove of infinite importance to the United States, inasmuch as it is calculated to serve as a barrier to prevent too great an extension of our population westward, ..." as quoted in Reuben G. Thwaites (ed.), *Early Western Travel*, ... op. cit. [see footnote 1], p. 20. James referred to the area and noted that "... The traveller who shall at any time have traversed its desolate sands, will, we think, join us in the wish that this region may for ever remain the unmolested haunt of the native hunter, the bison, and the jackall," as quoted in *ibid.*, p. 20.

30 See for example from Major S. H. Long to Secretary of War dated Philadelphia, Feb. 18, 1821 in *Letters Received*, L-75 (13), RG107, 4 pp. Long commended the services of Captain Bell and Lieutenants Graham and Swift in his letters to the Secretary of War dated Philadelphia, Feb. 7, 1821, 2 pp., Feb. 9, 1821, 2 pp., and Feb. 18, 1821, 3 pp., in *Letters Received*, RG07. In his letter dated Department of War, Feb. 23, 1821, 1 p., in *Register of Letter Sent*, 164/119, RG107, the Secretary of War noted that "Bell, Graham, and Swift have been ordered to rejoin their units until June as is reported in the letter of S. H. Long to the Secretary of War, Dated June 5, 1821, 2 pp. in *Letters Received*, RG107.
ranged for the publication of the results,\textsuperscript{31} and accounted for expenditures of money and equipment. On February 20, 1821, Long sent to the Secretary of war his "Report of the Western River Expedition ..."\textsuperscript{32}

James was appointed editor of the official narrative of the Expedition, that was published in Philadelphia by Carey and Lea in 1823 in two volumes and an atlas or portfolio.\textsuperscript{33} Apparently the official records were given or loaned to James by Long and the several scientists comprising the professional staff of the Expedition for use in preparing the publication.\textsuperscript{34} There is little question but that Long, Secretary of War John C. Calhoun, and other responsible officials considered them so valuable that they must be returned to and preserved in the archives of the War Department.\textsuperscript{35} Yet, very few of these official records are in the archives of the War Department.\textsuperscript{36}

\textsuperscript{31} There was a good deal of correspondence between Major Long and his superiors regarding the publication of the narrative and results of his expedition. For his correspondence with the Secretary of War see his letters dated Philadelphia, Oct. 30, 1821, 3 pp., Nov. 3, 1821, 3 pp., Nov. 6, 1821, 4 pp., Dec. 21, 1822, 2 pp., Jan. 3, 1823, 2 pp., and Dec. 24, 1824, 2 pp. in \textit{Letters Received}, RG107; and from the Secretary of War to Major Long dated Department of War, Nov. 17, 1821, 1 p., in \textit{Register Letters Sent}, 449/313, 1 p., RG107.


For his correspondence with Col. Isaac Roberdeau in the Engineer Dept. in Washington see his letters dated Philadelphia, Oct. 16, 1822, 4 pp., Oct. 26, 1822, 3 pp., Nov. 1, 1822, 4 pp., June 22, 1824 2 pp., and Dec. 17, 1824, 4 pp., in \textit{Miscellaneous Letters Sent and Received. Topographical Engineers, A. Misc. (Roberdeau)}, RG77.

\textsuperscript{32} The official manuscript "Report of the Western River Expedition by S. H. Long, T. Engr. to Hon. J. C. Calhoun, Secretary of War, dated Philadelphia, February 20th, 1821," is in Bulky File, Case 1 Drawer 4, NA Box 13, in RG77 in the National Archives. It is one red buckram bound volume of 109 pages manuscript and includes an early photograph of Long.

In his letter of July 31, 1821, the Secretary of War informed Long that the two reports by James that Long had sent to him were returned in order that James might have them published in the "Philosophical Society Transactions", but that "... when this is done the originals will be returned and be placed on files in the Topographical Office here ...," in \textit{Register of Letters Sent}, 295/178, RG107, 1 p. Apparently these two items were published as E. P. James, "Catalogue of Plants Collected during a Journey to and from the Rocky Mountains, during the Summer of 1820 . . .," \textit{Trans., Amer. Philos. Soc.}, Vol. 2, (1825), pp. 172-190; and his "Remarks on the Sandstone and Fletz Trap Formations of the Western Part of the Valley of the Mississippi . . .," \textit{ibid.}, pp. 191-215. Apparently these papers were prepared by James during his stopover in Smithland, Kentucky, April, 1821, and were transmitted to Long who communicated them to the Society with the permission of the Secretary of War, John C. Calhoun. They were read before the Society, possibly by Long, who was a member, on August 17, 1821.

\textsuperscript{33} Edwin James, \textit{op. cit.} [see footnote 12].

\textsuperscript{34} \textit{Op. cit.} [see footnote 32].

See especially Long's official statement as relayed to the Secretary of War from Pittsburgh in his letter of April 20, 1819 in \textit{Letter Received}, 9 pp., see p. 8, RG107. These instructions were issued as an order to members of the party on March 31.

\textsuperscript{36} Nearly all, if not all, of the records of the concerned agencies of the War in RG107 and Long and Isaac Roberdeau in RG77.
We know from official records in the National Archives that one of Long's primary activities was the preparation for publication of an account of his Expedition into the West and that Dr. Edwin James had been made responsible for the editorial work. In order to achieve this goal James apparently had been entrusted with as many of the official papers as were available and had the assistance of a number of the leading naturalists, such as Thomas Say and John Torrey. It appears that Long assumed responsibility for the cartographic efforts, which included the compilation of a map of the United States between Washington City and the Rocky Mountains (Fig. 1). This map was to be compiled from a wide variety of sources and especially from the surveys of the Expedition. We do not know precisely what cartographic records were made during the expedition, and we know of only a few that were made during the period thereafter to the date of publication.

In volume two of the Philadelphia, 1823 edition of the Edwin James publication is an appendix dated Philadelphia, 1822, entitled "Astronomical and Meteorological Records, ... taken on the Expedition ...," which was prepared by Lieutenant J. D. Graham. In the preface by Graham dated Philadelphia, July, 1821, is a detailed description of the instruments carried and used in taking observations. Significantly, Graham remarks in his enumeration that the Expedition had

"A common surveyor's compass, with a needle six inches long. This instrument was used tracing the course of the Missouri, as laid down on the map of the Country taken by Major Long and Lieutenant Swift — Made by the same."'

Graham also notes that

"Part second contains the observations which were made by Major Long and Lieutenant Swift after I separated from them at Engineer Cantonment, and which were afterwards calculated by me while those officers were engaged in projecting maps of the country explored by the Expedition."'

Graham also records that

"It is hoped that the following astronomical computations will be found to correct many errors in the geography west of the Mississippi, as laid down even on some of the latest and most approved maps . . ."'

Apparently no cartographic work was undertaken during the winter at Engineer Cantonment nor did Long in his assignment of duties so specify. Thwaites mentions that Lieutenant William Henry Swift pre-

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38 Ibid.
39 Ibid.
40 Edwin James (comp.), op. cit. [see footnote 12], Vol. 2, pp. lxxvii.
41 Ibid., pp. iii-v.
42 Ibid., p. iv.
43 Ibid., p. v. It will be recalled that Lieutenant Graham had been detached from the expedition as officer responsible for the "Western Engineer" in its surveys of the lower Missouri Rivers. The implication in the above quotation is that the maps were those prepared after the expedition returned East.
44 Ibid., p. vii. Graham refers especially to maps by John Melish and Dr. John H. Robinson (who had been on Zebulon Montgomery Pike's Expedition 1805-06).
pared "the map of the country explored by the expedition...," but this seems to be an inaccurate statement because in Long's official correspondence between 1820 and 1823 he states that he (Long) was preparing this map.

Long began the compilation of his map shortly after his return to Philadelphia in 1820, but a succession of bouts with poor health over several years prevented him from giving his continuous attention to the task. In his letter July 18, 1821, to the Secretary of War he remarks that

"...In consequence [of my health], I have been able to do but very little towards the compilation of my map—No efforts that my health will permit shall be spared in the speedy accomplishment of this object—Under your approbation I should be glad to make arrangements for the publication of the Map which I shall be able to effect in connexion with Mr. Tanner, the celebrated Map-Maker & Engraver of this place—Your instructions upon these points, will be thankfully received..."

On July 31, 1821, the Secretary of War stated that

"The decision on the publication of your map is reserved for further consideration. When completed you will report it to this Department when a decision will be made on your request to publish..."

Major Isaac Roberdeau of the Topographical Bureau on October 6, 1821, did commission Long to construct "...a Gen'l Map of the U. States on a large scale... I thank you for mentioning me as an accomplice in the undertaking, and will be pleased with contributing my mite in enhancing the project..." This apparently was to be a joint undertaking in addition to the map engraved for Long's book, and Long probably did most, if not all, of this work. Long indicated the errors in extant maps and suggested that since he had retained minutes of all of his reconnoitering he could

"Frame a sketch of the country on any scale that might be chosen. A Scale of six miles to one inch, would make a Map at least 25 feet square. Half that scale would be large enough to exhibit to advantage on one side of your [Roberdeau's] office, or in that of the Hon. Secretary..."

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46 Reuben G. Thwaites (ed.), Early Western Travels..., op. cit. [see footnote 1], Vol. 14, p. 41, note.
47 Lieutenant Swift had been reassigned to his regiment by June, 1821, as is stated in footnote 30.
48 Letter from S. H. Long to Isaac Roberdeau, dated Philadelphia, August 24, 1821 in Miscellaneous Letters Sent and Received, Topographical Engineers, 3 pp., RG77.
50 Letter from S. H. Long to the Secretary of War, dated Philadelphia, July 18, 1821 in Miscellaneous Letters Sent and Received, By Secretary of War, 3 pp. RG77.
51 Letter from the Secretary of War to S. H. Long, dated Department of War, July 31, 1821 in Register of Letters Sent, 295/178, 1 p., RG107.
52 In letter from S. H. Long to Isaac Roberdeau dated Philadelphia, October 7, 1821 in Miscellaneous Letters Sent and Received (Roberdeau), 4 pp., in RG77.
53 Ibid., p. 3.
54 Ibid.
During the next several years Long spent much of his time in Philadelphia working on a "large map" and with James on the compilation of the account of their Expedition. Long carried on rather extensive correspondence with Isaac Roberdeau in the Topographical Bureau and with Alexander Macomb about his work. He borrowed cartographic and other records from the Bureau in Washington for use in compilation and complained about the inaccuracies of many of the unpublished sources, especially of the location of geographic features on a map in terms of latitude and longitude.

On July 5, 1822, Long informed Isaac Roberdeau in the Topographical Bureau that

"Having nearly completed all my Maps; and my other business connected with the publication of our Book, affording some leisure, I should be able to devote a small portion of my time, in reploting my surveys, on a Scale adapted to the Big Map, we have in contemplation..."

The atlas or folio of "Maps and Plates" accompanying the two text volumes of the Philadelphia edition is dated 1822. It appears from this that Long has completed a map or a map in two sheets specifically for this Philadelphia edition of his "Account..."

In 1822 Henry S. Tanner copyrighted "A map of North America constructed according to the latest authorities," on a scale of about 120 miles to an inch at latitude 45° N. This map was included in his A New American Atlas ..., published in Philadelphia in 1823. In the remarkably informative introduction entitled "A Geographical Memoir" Tanner described his several sources and in some detail recognizes the valuable assistance of Major Long, especially the topographical information from his 1819-1820 Expedition. Tanner, however, says that

55 See especially the correspondence files in Miscellaneous Letters Sent and Received, Topographical Engineers, A. Miscellaneous (Roberdeau), March 1818 – Dec. 1826, RG77; Letters Received by the Secretary of War, 1821-1825, RG107, and Monthly Personal Reports from Officers, 1820-1830, RG77.


57 This atlas bears the subtitle "Maps and Plates," and is dated Philadelphia, 1822. It includes eleven plates, the first two of which are the eastern and the western sheets, together comprising the map. These two sheets match at longitude 92°W. from Greenwich to form one map as reproduced in the London edition (1823). However, the two maps are not precisely the same, as for example the deletion of "Drawn by S. H. Long, Maj. T. Engineers" and the substitution of "Engrav'd by Young & Delleker." The serious student might well question why editors of recent editions of the Account ... (i.e. in footnotes 1 and 27) have reproduced the London edition of the map rather than the Philadelphia, 1823 edition, which is substantially the first engraving of Long's "original." Careful comparison of each map further reveals rather significant differences in the title, the title block, placement of the Rocky Mountain front, the direction of river courses, and place names.

58 A New American Atlas Containing Maps of the Several States of the North American Union, Projected and Drawn on a Uniform Scale from Documents Found in the Public Offices of the United States and State Governments, and Other Original and Authentic Information, (Philadelphia, 1823), 18 pp. of explanatory text "Geographical Memoir," and 22 plates of colored maps. This is one of the earliest atlases published in the United States and set high standards of scholarship and cartographic presentation. Tanner relied heavily on official Government sources, including S. H. Long.
From the information collected, and observations later for latitude and longitude at frequent intervals during the progress of this expedition, Major Long constructed so much of his map as related to the region explored by him. The detail for the other parts was taken from my Atlas and other documents. This manuscript map was prepared for the use of the War Department on a scale of twenty-five miles to an inch, it occupies eight large sheets, and is executed in a style of neatness seldom surpassed...

Lieutenant Gouverneur K. Warren, in charge of the cartographic work in the Office of Surveys and Explorations in the War Department in the 1850's, and well acquainted with the map resources of the Topographical Bureau, compiled a "Memoir . . . giving a brief account of each of the Expeditions since A.D. 1800." In his notice of the Long Expedition of 1819-1820 he refers to the maps in the Atlas accompanying the official "Account" (1832) by Edwin James and says that...

"...accompanying the publication is a map, in two sheets, on a scale of 75 miles to an inch, . . . The original map in the Topographical Bureau is one sheet, on a scale of 36 miles to an inch."

It becomes at once apparent upon careful examination of the contents, the form, and the technique of rendering the cartographic presentation of the Philadelphia edition of the map (Figure 1) and the large manuscript map (Figure 2) that they are very different and that indeed the former appears to be based on, but at best only bears a resemblance to, the latter.

The former (Figure 1) may well be the engraver's revision or modification of a copy that was given to him by James or Long to engrave. If this is the case, where is the compilation (by Long?) that he used?

The manuscript map in the Office of the Chief of Engineers Headquarters Map Files in the National Archives is indeed on the scale of the manuscript map noted by Warren. It is a unique map and does not appear to have been published with an official Government or any other document. One may well conclude on the basis of internal evidence of this map, such as the lack of reference to Long's Expedition of 1823 and of other subsequent expeditions, that Long completed this map before he...

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50 Ibid., pp. 6-7. Tanner concludes this paragraph with a complimentary remark: "Whether we view this map as a work of art merely, or as a representation of an interesting and hitherto unknown part of our country, it cannot fail to augment the well-earned reputation of its accomplished author." Quotation is from p. 7.


61 Ibid. This matches well with the facts noted in footnotes 57 and 60.

62 This manuscript map may be described as follows: "This Map of the Country situated between the Meridian of Washington City and the Rocky Mountains exhibiting the route of the late Exploring Expedition commanded by Maj. Long, together with recent surveys and explorations by himself & others is most respectfully inscribed, by his most obedient and humble servant S. H. Long, Major, U. S. Topl. Engineers . . . To the Hon. John C. Calhoun, Secretary of War . . . Scale of Miles; 36 miles to an inch." Dimensions 54½ x 48¼ inches (edge of map) and 52½ x 46 inches (between neat lines) Manuscript map in color and in ink on paper. Map No. U.S. 62, in Records of the Office of the Chief of Engineers, Headquarters Map Files, RG77 in the National Archives, Washington, D.C.
left the East in 1823 on his tour to explore the St. Peters or Minnesota River. Indeed, this may well be the proposed "big map" that was planned, because we have no record of any other and subsequent correspondence between Roberdeau and Long, that refers to the completion of the "big map" as originally planned. Certainly this manuscript map is one of the most valuable maps in the history of early American cartography. It is unfortunate that during these 144 years it has reposed in obscurity in favor of an inferior version.
WAGE LABOR AS A PRIMARY
PLANTATION INDICATOR—
THE CASE OF AMERICAN COTTON FARMS*

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Complex economic forms such as farming systems cannot be completely
defined by only one or two characteristics. Rather it is a unique combina­
tion of several features, many of which are shared by numerous farming
systems, that sets apart the particular economic organization. There is no
doubt, however, that these combinations have keystones, characteristics that
are more fundamental than others and yet reflect many of these other
characteristics as well. These are the criteria one searches for when he
wishes to discern at least approximate distributions of economic forms that
are of continental scale but whose extensiveness makes comprehensive field
examination impossible.

For plantation farming the most fundamental criterion is size, although
there is much argument over what specific size minimum or minima should
be accepted. Nor is there any uniform feeling on how the size qualification
should be expressed. If a flat size delimitation is rejected as too arbitrary,
then there is the bigger problem of selecting an indicator that ensures a
farming operation large enough to guarantee a sizable acreage. The
researcher who is interested in the plantation type of farm in the United
States soon discovers that the few studies made of large farms deal principally
with the scale of operations, something that is by no means always com­
mensurate with large size, particularly when expressed monetarily, as in
value of products sold.1 Some of these studies do consider size specifically,
but only as one criterion among several other equally-weighted criteria, not
all of which need be included in order to have a small-sized farm classified
as "large."2 Furthermore, as intensification continues on American farms,
the discrepancy between what the economist considers a large scale farm
and what the geographer assumes to be a plantation will increase. As in­
tensification proceeds, more and more farms will become "larger" in such

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*Grateful acknowledgement is made to the University of California for financial
support of this study and to the Department of Geography, University of Chicago, for
permission to use map 210 of the Goode Base Map Series (Copyright by the Univer­
sity of Chicago).

** This article continues Professor Gregor's long-standing research interest in
agricultural geography. His doctoral dissertation, Changing Agricultural Patterns in
the Oxnard Area of Southern California, (Los Angeles, 1950), examined a topic and
a field area that Professor Zierer investigated twenty or more years before.—Ed.

1 As in the special report by the Census Bureau on Large-Scale Farming in the
U.S. Govt. Print. Off., 1963). Value of products both sold and used by the farm opera­
tors was the criterion used by R. D. Jennings in his study, Large-Scale Farming in the
United States, 1929, Fifteenth Census of the United States: 1930. Census of Agri­

2 Acreage, number of people employed, and capital invested were given equal
emphasis by D. Curtis Mumford, Large-Scale Farming in the United States, U.S.
terms as investment in lands and buildings and in value of production, but not in acreage. To reduce such divergences and to give areal size the greater weight that a plantation designation demands, the following basic qualification of a plantation is proposed: a farm large enough to require an annual cash outlay for the equivalent of at least five resident workers with families.

This index was applied to American cotton farms, using published and unpublished data from the 1959 Census of Agriculture for labor expenditures and farm labor surveys of the Department of Agriculture for wage rates. The selection of cotton farms for a test application of the wage-labor criterion is a logical one. Of all farm types in the United States, large cotton farms have always been viewed as the most representative of the plantation. Yet their full extent has never been appreciated; in fact, they have been increasingly depreciated. Overemphasis of the tenant role, particularly that of the cropper, has figured strongly in this myopia. Tenants have been an inseparable part of the census definition of the cotton plantation, dating from the first report on plantations in 1910. Yet additional statistics compiled during this same period show the South already second only to the West in percentage increase of wage-labor expenditures. Since the last world war the shift from tenant to wage labor in the South has been revolutionary. Between 1954 and 1959 alone, tenants decreased by 46 per cent: for just croppers, it was 55 per cent.

The reaction of the Census Bureau has been to discontinue its regular reports on “multiple units,” its term for plantations. But the plantation has not declined, the operator merely substituting the wage hand for the tenant on an ever larger scale. Another adjustment by the operator in favor of cash payments has been the use of the “quasi-share labor” system of sharecropping. This is an arrangement by which the cropper is paid a day wage for pre-harvest work as a member of a crew and given a share of the crop on a patch of land. Furthermore, croppers and other tenants on southern plantations are also paid cash for a variety of non-agricultural jobs, a normal part of the plantation routine that has been going on for decades. Meanwhile large cotton farms have developed to the west of the traditional plantation area and have from their very beginning been heavily dependent on wage labor. An extensive pattern of cotton plantations therefore exists, one that is far larger than previous definitions and most conceptions would admit. It remains only to distinguish that pattern.

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Plantation Distribution

The overall distribution pattern of those cotton farms that paid wages for the equivalent of at least five resident workers is not only extensive but greatly unequal (Figure 1). More than 9,000 plantations were computed for sixteen states, stretching from coast to coast, but almost 70 per cent of those farms were in just three states—Texas, Arkansas, and Mississippi. Further, of this 70 per cent, Texas alone had 2,780 plantations or almost half. Other farm patterns may be detected on the basis of more geographic regions. About 90 per cent of the cotton plantations appeared to be roughly divided between the semiarid-to-arid areas of Texas, New Mexico, Arizona, Nevada, and California and the humid Mississippi “Delta” portions of Mississippi, Arkansas, Louisiana, Tennessee, Missouri, and Kentucky. The more degraded uplands of Alabama, Georgia, South Carolina, and North Carolina took up most of the remaining plantations.

Lower yields and lesser mechanization account in good part for the rapid falling off in plantations from the Delta area to the east. To the west, yields are even bigger and mechanization still more advanced than in the Delta, but the number of plantations, once beyond the Texas Panhandle, again declines. One reason for this paradox is that greater mechanization, while helping to make short-season (i.e., wage-labor) workers more numerous on western than on southeastern cotton farms, also makes wage labor less important for a greater proportion of the large cotton farms in the West than it does for those in the middle South where mechanization is still not quite so advanced. Another reason is the smaller number of western cotton farms to begin with. Total cotton farms in the four westernmost states were only one-fifth the number of all cotton farms (excluding cropper units) in the four easternmost states. However, plantations were twice as numerous in the western segment as they were in the eastern (1,312 to 651). None of the old cotton plantation states, in fact, equalled the number of plantations in any of the three states of California, Arizona, and New Mexico. Another east-west contrast is in the interstate pattern of plantations. Plantations diminish eastward, from Alabama to North Carolina, without a break; in the west, they increase westward, California having almost twice as many plantations (600) as New Mexico (344).

The overwhelming superiority of the southern midlands in plantation numbers is not without its qualifications from the standpoint of the plantation definition used here. It is difficult to say, however, whether these qualifications would really affect this leadership in any significant way. This regional leadership would undoubtedly be increased if cotton farms that employed a sizable amount of non-wage labor were given plantation status. Such farms, which employ five or more laborers but do not expend cash sufficient to pay for five laborers at current farm wage rates, are especially numerous in the Delta. Nevertheless, they are a distinct minority compared with those farms classified as plantation here. It is also undoubtedly true that the plantation criterion of a cash equivalent of a year-round work force discriminates more against southern cotton farms because their work season is shorter and less intensive than in the West. Still this bias would seem to
be at least considerably modified by the fact that Delta farms hire more than twice as much labor per farm as western farms.\textsuperscript{10}

Another bias in the plantation definition, but one that enhances rather than minimizes delta leadership, is the consideration of farms as supervisory, rather than ownership, units. But, without minimizing the handicap of being unable to obtain from the census information on farm size in terms of ownership, a case for the supervisory unit may also be argued on increasingly stronger grounds. The supervisory unit is becoming more and more a highly individualized economic unit as a growing number of large landowners al-

Figure 2

locate different farming operations among their various land units. Moreover, as cropper and other tenants leave the plantations, the supervisory unit comes closer to being the ownership unit as well. Of course owners have also purchased more land, and, in the process, have often acquired far-flung networks of properties. But this raises the more practical question of where one should draw the line in delimiting the plantation as a spatial unit. Fragmentation is certainly not unusual to plantations, but there would also seem to be a need for some boundary, beyond which a collection of spatial entities could no longer be logically called a plantation but a collection of plantations.\textsuperscript{11} Nor does the pattern of a fragmented ownership neces-


\textsuperscript{11} Prunty would consider fragmented holdings part of one plantation if (1) they were close enough together so that a central machinery pool could service them, and (2) their management were clearly centralized. He also notes that such fragmented complexes in the South, although “occurring often enough to be disturbing,” are in the minority. Merle C. Prunty, “Some Problems in Classification of Contemporary Plantation Occumance Types,” \textit{Memorandum Folio, S. E. Division, A.A.G.}, IX (1957), p. 84.
sarily correspond to the pattern of operational control by the owner, as leasing becomes more common. From these standpoints, at least, the plantation as defined by the immediate supervisor would appear to be closer to spatial reality than that based on ownership. Plantations, as presented here, were operated almost completely by owners, part owners, or managers.

To determine the number of plantations, the daily wage rate of a farm worker supplied with a house was multiplied consecutively by 26 (days), 12 (months), and 5 (workers) to obtain the annual amount paid five workers. This figure was then interpolated within wage-expenditure classes of farms, as provided by the agricultural census, to secure the total number of farms that were paying at least that amount.

**Plantation Acreage**

The 14,676,000 acres of farm land in cotton plantations were distributed about the same as the plantations (Figure 2). Some important nuances may be seen, however. Those states sharing the Delta area had only 31 per cent of all the farm land in plantations, compared with 55 percent of all the plantations. Texas, however, was again the state leader, and with a higher percentage of farm land than it had for plantations (38 vs. 31). This improvement, combined with the equally-improved status of California, Arizona, and New Mexico, gave the plantations in the drier West a heavy edge over the Delta states in acreage.

Acreage in plantations was obtained by assuming that plantations were the largest farms and then interpolating their position among the farm-size classes provided by the census for all cotton farms. To avoid the open-end acreage class for the largest farms, means of acreage classes for non-plantation farms were multiplied by the number of farms corresponding to each farm-size class, totaled, and then deducted from the total acreage in cotton farms.

Much plantation land is not cropland (Figure 3). The nadir is reached in Nevada and New Mexico, where lack of water was undoubtedly the main reason for only 10 to 15 per cent of the farm land being in cropland. Proportions were also low in the Southeast, ranging from 25 to 50 per cent. Even in Texas and the delta states, with the exception of Missouri and Kentucky whose share of delta plantations is quite small, cropland proportions were no more than 50 per cent. But not all non-cropland can be considered idle land, particularly on the cotton plantations in the humid eastern sections where additional income is obtained by pasturing woodland and cutting timber. The only state that had both a respectable number of plantations and well over half of its plantation land in cropland was California (66 per cent). Larger blocks of land suitable for cotton growing and an abundance of irrigation water are the main explanations for this high cultivation intensity.

Cropland acreage for cotton plantations was obtained in the same way as farm land acreage, except that plantations were matched with cropland-acreage classes instead of farm-size classes.

**Value of Products Sold By Plantations**

California has shown a considerably improved position in the distri-
bution of value of products sold by cotton plantations (Figure 4). Texas again led all states with 255 million dollars, but California was a respectable second with 207 million. Together, they yielded slightly more than half of the 901 million dollars worth of products sold by all cotton plantations. If Mississippi and Arkansas, two other outstanding producers, are added, the proportion of the 901 million increases to almost 80 per cent. On a more geographic basis, the huge totals of Texas and California, when compared with the respectable ones of New Mexico and Arizona, give the plantations of the arid and semiarid areas a definite margin over the Delta states. When the value of products sold is related to individual plantations, the Far Southwest stands out even more prominently, with California again the most conspicuous (Figure 5). Unlike the distribution pattern previously described, that of production value describes an uninterrupted gradient from the Pacific to the Atlantic. The gradient is steepest in the West, where production value per California plantation ($346,000) was more than twice that of the second-ranking state, Arizona ($155,000); it is at its shallowest in the three easternmost states of Georgia, South Carolina, and North Carolina, with values per farm ranging from $41,000 to $45,000.

![Value of products sold per farm](image)

**Figure 5**

Value of products sold by cotton plantations was computed on the basis of the ratio of cropland on cotton plantations to cropland on all cotton farms. All cotton farms that sold less than $10,000 worth of products were excluded from the computations, as they were throughout the study. Their number, in any case, was negligible.

**Plantation Size**

An east-west progression similar to that for plantation production value may be seen in plantation farm sizes, but with two major exceptions, Cali-
fornia and Mississippi (Figure 6). Mean size of plantations in California (2,266 acres) was anywhere from one-fifth to one-half that of Nevada, Arizona, or New Mexico. Mississippi had a plantation mean of 850 acres, the smallest size of any of the states except Kentucky. Also like the average value of products sold per plantation, mean sizes show a large range, from the 4,200 acres of Nevada to the 830 acres of Kentucky. However, only two of the sixteen states with cotton plantations had a mean of less than 1,000 acres.

Since only a few large plantations can distort the average, a more realistic picture of plantation size can be obtained by securing the median (Figure 7). Median sizes were derived by interpolating the median number of plantations in each state within the proper farm-size classes. The result was considerably smaller sizes for most states, ranging from 2,000-acre median for Nevada to 600 acres for Kentucky. With a greater proportion of their plantations in the "exceptionally large" category, the four western states show the greatest variances between mean and median sizes. The median size of cotton plantations in California, 653 acres, and the smallest median for any state except Kentucky, was 75 per cent smaller than the mean. In Georgia, South Carolina, and North Carolina, on the other hand,

[Figure 6: Map showing mean size of cotton plantations by state]

the very large farms were apparently minor enough to allow median sizes to be slightly larger than means. Thus, contrary to the usual belief, the major cotton-producing states of California, Mississippi, and Arkansas have generally smaller plantations than those of the less important cotton states of Louisiana, Georgia, Oklahoma, Missouri, and the Carolinas.

CONCLUSION: PLANTATIONS AND THE COTTON INDUSTRY

When plantation data are related to those for all cotton farms, they show plantations to be an impressive part of the cotton economy, especially
Figure 7

Figure 8
in light of their minority position in numbers. Plantations in 1959 comprised less than 5 per cent of all cotton farms (and excluding cropper units). By states, the share was greater but still fairly small. In fifteen of the sixteen cotton states, plantations formed no more than 10 to 12 per cent of the farms (Figure 8). Moreover, the smallest shares were in the more traditional southern cotton areas, and this applied almost as much to the highly productive delta area as it did to the marginal Southeast. Plantations were relatively most important in the newer cotton areas of Arizona, New Mexico, and Nevada, but their combined number formed only 8 per cent of all the cotton plantations in the nation. Even in California, where much publicity has been given to its large cotton farms, plantations were but 12 per cent of the farms specializing in cotton.

![SHARE OF COTTON-FARM ACREAGE IN STATE](image.png)

In contrast are the positions of the plantation in total cotton-farm acreage and value of products sold by cotton farms. About a third of both were accounted for by plantations. By states, these proportions increase still more, with plantations in some states accounting for as much as 60 to 80 per cent of the acreage and 45 to 75 percent of the value of products sold (Figures 9-10). And although, like plantation numbers, the smallest shares for these two categories were in the Southeast, the shares in the Delta area were considerably higher. However, the relative importance of plantations was again greatest in the states from New Mexico westward. In California, plantation production was so intensive that it accounted for two-thirds of all the value of products sold by cotton farms in the state. In no other state was the disparity between plantation numbers and productivity so great.
Figure 12

Figure 13

101
A comparison of the national rankings of cotton plantations and all cotton farms also illustrates the significance of the larger farms. This is represented (Figures 11-13) as the differences between the shares which each farm group had of its national total.

Plantations in the leading cotton states were generally more dominant among all plantations than were all cotton farms in those states among the nation's cotton farms. Conversely, plantations in the less important cotton states were generally inferior to all cotton farms in national rankings. Disparities between the two farm groups, however, were less in acreage and value of products sold than they were in number of farms, reflecting both the greater number and intensity of production on small farms. These two characteristics were emphatic enough to assign to Texas plantations a negative disparity which exceeded that of any other state.
THE EVOLUTION OF THE AMERICAN LEMON-GROWING INDUSTRY*

ROBERT W. DURRENBERGER
San Fernando Valley State College

Nearly one-third of all the lemons grown in the world come from a few fruit-growing districts in Southern California. Average annual production over the past ten years has been about 15,000,000 boxes per year.¹ The only other major producing area in the world, Italy, has averaged around 14,000,000 boxes per year.² The production of the principal lemon-growing areas of the world is shown in Table 1.

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<th>62-63</th>
<th>63-64</th>
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<td>13.9</td>
<td>19.0</td>
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<td>10.4</td>
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<td>2.4</td>
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On the basis of value of production lemons rank fifteenth among the agricultural commodities in the State of California. In the eight most important lemon-producing counties lemons usually account for ten per cent or more of the total value of agricultural production (Figure 1). In Ventura County (Figure 2) the lemon is the most important commodity produced and generally accounts for over one-third of the total value of all agricultural products grown within the county.³ (Table 2)

This impressive position in the production of lemons is the result of a remarkable growth of the industry over the past one hundred years. During the 19th century and in the first decade of the 20th century Italian fruit-growers held a virtual monopoly on the sale of lemons in the United States. Fruit grown in Florida and in California was considered to be of poor quality and could not compete with Sicilian fruit.⁴

Very gradually California growers overcame their production and marketing problems and captured a larger and larger share of the world

¹This study expands certain aspects of Prof. Durrenberger’s doctoral dissertation, which was supervised by Prof. Zierer [Climate as a Factor in the Production of Lemons in California (Los Angeles, University of California, 1955) 350 pp.]


⁴Country Agricultural Commissioners Reports for 1965.

LEMON - PRODUCING DISTRICTS

Figure 1

1. JAMES HILL'S ORCHARD
2. TULARE COUNTY
3. GOLETA
4. CARPENTERS
5. SANTA CLARA VALLEY
6. ORANGE COUNTY
7. SANTA ROSA VALLEY
8. SAN FERNANDO VALLEY
9. PIERCE HILLS - NORTH WHITTIER HEIGHTS
10. GLENDBURG - SAN DIAMAS LA VERNE
11. UPLAND
12. ALTA Loma
13. ETHERDA
14. ARKINGTON
15. CORONA
16. ORANGE COUNTY
17. TEMPERED
18. VISTA
19. ESCONDIDO
20. RANCHO SANTA FE
21. CHULA VISTA - NATIONAL CITY
22. LEMON GROVE - EL CAJON
23. THERMAL
24. Yuma Junction
25. Yuma Mesa
TABLE 2

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<thead>
<tr>
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<th>1965 (Acres)</th>
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<tbody>
<tr>
<td>Alameda</td>
<td>1</td>
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<td>Butte</td>
<td>7</td>
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<td>Fresno</td>
<td>146</td>
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<tr>
<td>Imperial</td>
<td>146</td>
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<tr>
<td>Los Angeles</td>
<td>2,760</td>
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<tr>
<td>Orange</td>
<td>1,040</td>
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<td>Riverside</td>
<td>3,198</td>
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<tr>
<td>San Bernardino</td>
<td>3,949</td>
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<tr>
<td>San Diego</td>
<td>1,946</td>
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</tbody>
</table>
| Santa Barbara | 5,564 | 200
| Santa Clara | 6     |
| Santa Cruz | 1       |
| Sonoma   | 24          |
| Tulare   | 1,697       |
| Ventura  | 21,272      |
|          | 41,759      |


lemon market. Their share of lemon sales in the United States rose from a few per cent in the 1880's to 18 per cent in 1900. By 1920 their share had increased to 75 per cent. After 1930 only small numbers of foreign lemons were being imported and American lemons were entering West European markets in large numbers.5

How did the lemon-growing industry become established in the United States, and what factors have led to the dominant position of Southern California in the industry?

ATTEMPTS TO GROW LEMONS IN SOUTHEASTERN UNITED STATES

It appears almost certain that the lemon (Citrus limon) is a native of northeastern India or Burma. The earliest references to the lemon are to be found in Sanskrit and Chinese literature while the Greeks and Romans seem to have had no knowledge of the tree or its fruit. The Moors carried the plant into Spain, and Crusaders brought the plant back to Italy from Palestine and Turkey.

From Spain Columbus carried lemon seeds on his second journey to the New World. From the West Indies the lemon migrated to the mainland area where, in a climate somewhat like that of southeast Asia, it grew wild. The Spanish Conquistadores and mission fathers furthered the spread of this and other varieties of citrus wherever they went in the Americas. In Florida the Indians are said to have used citrus and aided in its dissemination.7

Citrus fruits were carried northward through Florida into the Cape

5 Data obtained from various issues of the California Citrograph and the annual reports of Sunkist Growers.

105
Fear settlement in the Carolinas in 1664 and westward along the Gulf Coast as far as Texas. In Florida most of the early plantings were along the northeast coast in the Indian River country and around the principal settlements. According to accounts of English visitors to St. Augustine, Florida, in 1763, oranges and lemons grew in the city without cultivation and produced fruit better than that of Spain and Portugal. Plantings along the Gulf of Mexico in Alabama and Mississippi were near the coast on the high bluffs of the salt water bayous while in Louisiana, "the infallible orange region," as it was called, extended for about fifty miles along the lower reaches of the Mississippi River.

However, commercial production of citrus in the Southeast was not significant until after the American annexation of Spanish territory in 1821. Settlers from the United States took over Spanish plantings and the groves of trees which grew wild and began to ship citrus to other parts of the United States.

Prior to the 1860's the commercial citrus crop of Florida was limited to the output of a few small groves in the northern part of the state. Most of the groves were located along the banks of the St. Johns and other rivers, since practically the only means of transportation was by river boats. The methods of culture, harvesting, and shipping were very crude, but in spite of the many handicaps the pioneer growers prospered. The building of railroad lines into the area in the early sixties brought about a rapid growth of the industry. A U. S. Department of Agriculture report published in 1887 describes this development:

Lemon culture in south Florida is making rapid strides of progress. Well informed cultivators know that the lemon is a necessity to the people of the United States: that there is a market for every first class lemon, that can be produced, and more too . . . .

The time was, and not so very long ago, either that the most of the people in Florida believed that a marketable lemon, within sweet rind, first class acid, and medium size, could not be produced on Florida soil. The only lemons known in Florida were coarse, overgrown seedlings of the Messina and Sicily lemons, the little bush 'everbearing' variety, and the venerable 'French,' or 'Florida Rough' lemon. Strange as it may seem, there are still persons in South Florida who cling, like the dog to the proverbial bone, to the belief that marketable lemons cannot be produced in Florida, but they are within the last ten years comparatively scarce, and there as few now, except the veriest of backwood's 'crackers,' who do not have at least one or two pet Fenvos or Villa Francas in the yard, and still others set out twenty trees, and this man one hundred, and that man five hundred, and so on.

Lemon culture has thus far received the most attention among the progressive fruit growers of the 'lake region' of Florida, though lemons are cultivated to a certain extent all over the peninsula of Florida, and to a slight extent in lower Louisiana, especially in the parish if Plaquemines, where the commercial lemons are now receiving some attention. Florida is indebted to Mr. Bidwell and General Sanford for the first importation of the five varieties of commercial lemons now attracting so much attention. A

9 Ibid., p. 120.
10 Louisiana Agricultural Experiment Station, Horticulture, Results of the Year 1893. (Baton Rouge, 1894), pp. 878-79.
great part of General Sanford's large grove at Belair is planted to those lemons, and although it has several times suffered severely from cold, the trees are very healthy and thrifty. On the lower range of keys, so many of which are adapted to the culture of the lime and lemon, none of the fine varieties are yet known, but the knottiest, smallest Florida lemons and limes are grown for the Key West market.

One cause, and a just one, of the bad name which Florida lemons have had in the Northern markets, has been the indiscriminate shipment in years past (and in some cases it is still continued) of the inferior lemons so abundant in Florida.\(^\text{12}\)

The same report listed no less than thirty-one varieties of lemons growing in Florida at this time. This, in part, accounts for some of the difficulties encountered in marketing the crop. In addition, many of these were seedling plants which added to the heterogeneous quality of the crop. The major advantage enjoyed by the Florida lemon industry was that most of the fruit was picked and marketed in the latter part of August and during September and October when shipments from overseas were light.\(^\text{13}\)

The great freezes of the winter season in 1894-1895 eliminated Florida as a major lemon-producing area. From a peak production of 57,219 boxes in the 1893-1894 season, lemon production fell to 713 boxes in the 1894-1895 season and to zero in the 1895-1896 season. In the years following, the highest production attained was a meager 2,200 boxes during the 1898-1899 season.\(^\text{14}\)

Severe freezes had previously affected the Florida citrus industry in 1879-1880, 1883-1884 and 1885-1886.\(^\text{15}\) Most growers became convinced of the inadvisability of trying to grow lemons under such conditions.

In addition, other problems existed which operated to prevent the reestablishment of the industry in Florida. Citrus scab had disfigured much of the fruit, making it unmarketable. Curing the fruit was difficult under the hot and humid climatic conditions in Florida. Various fungus growths resulted in great loss because of fruit rot.\(^\text{16}\) For these reasons, Florida and other areas in the Gulf Coast region passed out of the picture as centers of commercial production of lemons after 1895.

**BEGINNINGS OF COMMERCIAL PRODUCTION IN CALIFORNIA**

The first plantings of citrus in the American Southwest were at the Spanish missions in Arizona between 1707 and 1710, and it is known that the lemon was growing in Baja California as early as 1739.\(^\text{17}\)

It is possible that lemons were first grown in Alta California at the


\(^{14}\) Report of the California State Board of Agriculture. 1911, (Sacramento, 1912), p. 140.


\(^{17}\) Ibid., p. 32.
San Diego Mission. Evans, writing in 1874, made the following statement concerning the planting of citrus at some of the other missions:

Although the only living orange-trees planted by Father Junipero and his associates, or their immediate successors, are to be found in the mission gardens at San Gabriel, in Los Angeles County, and at Old San Bernardino, in San Bernardino County, there are traditional evidences of orange groves having been planted by them and flourishing at the mission settlements of San Louis Rey and San Buenaventura, which disappeared with the decay of those venerable institutions.\(^{18}\)

General Vallejo is quoted as saying that he remembered lemons growing at Monterey and at San Gabriel in 1822.\(^{19}\) In 1849 Bryant observed lemons growing at the San Fernando Mission.\(^{20}\) The California State Agricultural Society reported, in 1858, lemons growing at San Gabriel and San Luis Rey\(^{21}\) and Brewer bought lemons at Mission San Gabriel in December, 1861.\(^{22}\) Some of the other missions undoubtedly had plantings of lemons. Seeds and plants were carried from these mission plantings by a relatively small number of the early ranchers and farmers.

Following the discovery of gold in California the influx of population resulted in a greatly increased demand for food of all kinds. The demand for an acid fruit was met by imports of lemons and limes from Europe and by an increased production of both these fruits within the state.

Prior to 1848 there had been little planting of citrus in the northern counties since most of the Spanish settlement had occurred to the south of the San Francisco Bay area. During the 1850's and early 1860's commercial plantings in these northern counties remained few in number for several obvious reasons. First of all, most of the people were engaged in a search for gold and were not interested in agriculture. Secondly, a large percentage of the gold miners came from the eastern part of the United States and from Western Europe and had no background in citriculture.

However, many people planted the seeds of fruit purchased for home consumption, and, as a result, citrus plantings were eventually made in many parts of the state. An example of how this was accomplished is found in an article on orange culture in California which appeared in *The Overland Monthly*. It quoted Dr. F. Strentzel of Martinez as follows:

> My efforts in orange culture date from the year 1853, when I bought some large and fine-flavored oranges and a few Sicily lemons in San Francisco, planted the seed in boxes, and raised them in my tent home. They grew luxuriantly, more so indeed than any I have planted since. The young trees transplanted to the orchard nursery, even with the best shelter and

---

\(^{18}\) Taliesen Evans, “Orange Culture in California,” *The Overland Monthly*, 12 (March, 1874), p. 236. Most of the early writers used the term “orange grove” to refer to any citrus planting. Most orange groves included oranges, limes and lemons.


\(^{21}\) *Transactions of the California State Agricultural Society*, 1858, (Sacramento, 1859), p. 293.

Most of these early citrus plantings in northern California were incidental to home adornment and ornamentation. So far as there was a home or local demand there was production, but not much more.24

Even Southern California with its Spanish heritage and its mission plantings of citrus had only a small commercial industry. Governor John Downey, writing in 1874, explained this fact as follows:

'It was a difficult undertaking for the ranchero to build a fence to protect his orchard from the multitude of wild stock that surrounded him, even to the door of his pueblo home.25

This first citrus planting or any size was at Mission San Gabriel about 1805.26 A few other plantings followed several decades later. The orchard at San Gabriel was fairly mature when Luis Vignes made his first plantings in the early 1830's.27 Shortly thereafter plantings were made within the city limits of Los Angeles by Alonzo Wolfskill and Manuel Requena.28

The groves of Vignes, Wolfskill, Requena and other early orchardists of Southern California in no way resembled a present-day horticultural enterprise. These men were interested in determining precisely which species and varieties of fruit would do best in a given locality. As a result, their orchards contained a little of everything. During this early period the grape appeared to be the most profitable fruit crop. Wine could be easily shipped to the gold fields and around the Horn to the East Coast.

Some idea of the composition of these orchards can be gained from the descriptions found in the book, Semi-Tropical California. The number of trees contained in several of the orchards are given below:

Mrs. H. Shaw's holdings on San Pedro Street in Los Angeles consisted of thirty-five acres on which were planted the following:29

- 2,500 young orange and lemon trees
- 1,000 young lime trees
- 200 bearing orange trees
- 200 lime trees
- 200 Sicily lemon trees
- 300 apricot trees
- 200 apple trees
- 20 apricot trees
- 20 walnut trees
- 20 peach trees
- 20 almond trees
- 200 grape vines
- 4 acres of strawberries and small fruits.

23 Evans, op. cit., p. 238.
27 Spalding says that this grove was planted in 1834. Newmark indicates that Vignes came to Los Angeles in 1829 and planted his first orchard shortly thereafter. Davis reported that Vignes was the first man to raise oranges in Los Angeles and that Vignes was well established by 1833. [Spalding, op. cit., p. 7; William H. Davis, Sixty Years in California (San Francisco, A. J. Leary, Publisher, 1889), p. 169; Maurice Newmark and Mareo R. Newmark, Sixty Years in Southern California (Boston, Houghton Mifflin Company, 1930), p. 197.]
28 Downey, op. cit., p. 560.
An orchard of fifty acres lying on the south side of Main Street in Los Angeles had:  

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<tr>
<th>Trees Type</th>
<th>Quantity</th>
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<tbody>
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<tr>
<td>Bearing lemon trees</td>
<td>100</td>
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<tr>
<td>Lime trees</td>
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<tr>
<td>Young orange, lemon and lime trees</td>
<td>500</td>
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<tr>
<td>Italian chestnut trees</td>
<td>100</td>
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<tr>
<td>Walnut trees</td>
<td>300</td>
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<td>Fig trees</td>
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<td>Apricot trees</td>
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sold for five to six dollars a box while California lemons for one dollar a box.35

Most of the lemon trees planted in California at this time were seedlings of local and inferior varieties. The fruit was allowed to remain on the trees until ripe with the result that the lemons became large and coarse textured. The fruit produced only small quantities of a bitter juice with a low acid content.

Some of the pioneer lemon growers reasoned that greater uniformity in fruit was needed. This was achieved with the importation of Lisbon lemon trees in the 1870's and the development of the Eureka variety about the same time. By 1880 it was generally accepted that these two varieties were the ones best suited for California.36 Better cultural practices including grafting methods ensured the propagation of trees capable of producing high quality fruit.

Important, also, in this matter of producing and marketing a high quality product was the development of marketing associations which picked, packed and sold the fruit. The first such group was the Lemon Growers Exchange of Upland formed in 1893.37 Other groups formed soon thereafter, and by 1897 an organization known as the Lemon Growers Advisory Board began operating in the Southern California Fruit Exchange.38 Eventually these grower associations were able to standardize the California product and to control the number of lemons made available for sale as fresh fruit. Thus, they have been able to regulate the selling price of lemons in the grocery stores of the nation.

Completion of the transcontinental railroads in the 1880's had opened eastern markets to California fruit, but even this was not enough to permit California lemon-growers to capture a significant portion of the market.39 However, competition among the railroads led to lower freight and passenger rates to and from California. Prior to 1885 it cost as much at $1000 to ship a carload of produce to Chicago. Early in 1885 this dropped to $400 a car. With the completion of the Santa Fe the freight rate between Los Angeles and Chicago fell to $200 a car.40

In spite of the lower freight rates foreign fruit could be delivered to the major eastern cities at a lower cost than could California fruit. Table 3 shows the freight rate advantage enjoyed by imported fruit in the eastern markets.

To combat this economic advantage the California growers fought successfully for tariff protection, and import duties of varying amounts have been placed on lemons. The Act of July 24, 1897 increased the rate on lemons from about one-half cent a pound to one cent a pound. Further increases in the tariff occurred in 1913 and 1930 with the rate on lemons
reaching two and a half cents a pound in the latter year.\footnote{41 G. Harold Powell, \textit{The California Lemon Industry} (Los Angeles, The Citrus Protective League, 1913), p. 13. For small lemons $1.50 a thousand would mean a tariff of about one cent a pound. However, for the average lemon this tariff averaged about one-half cent a pound.}

\begin{table}[h]
\centering
\caption{Rates on California and Italian Lemons to New York, Pittsburgh, Cincinnati, and Chicago. (Carload lots—1911)}
\begin{tabular}{|l|c|c|c|c|c|}
\hline
\textbf{DESTINATION} & \textbf{Per Cwt.} & \textbf{Difference in favor of Italy} & \textbf{Per Box} & \textbf{Difference in favor of Italy} \\
\hline
New York, N.Y. & $1.00$ & $0.358$ & $0.642$ & $0.84$ & $0.304$ & $0.536$ \\
Pittsburgh, Pa. & $1.00$ & $0.658$ & $0.342$ & $0.84$ & $0.559$ & $0.281$ \\
Cincinnati, O. & $1.00$ & $0.758$ & $0.242$ & $0.84$ & $0.644$ & $0.196$ \\
Chicago, Ill. & $1.00$ & $0.758$ & $0.242$ & $0.84$ & $0.644$ & $0.196$ \\
\hline
\end{tabular}
\end{table}

* Based on rate of 30.4 cents per box of 85 pounds to New York and not including transfer charge in New York of 3 cents per box. From the 30.4 cents rate a rebate of 6 cents should be deducted on all lots of Italian lemons of 1,000 boxes or over.

With a superior product, an able marketing organization, and with tariff protection the California lemon-growing industry has been able to control the American market since 1930 and now sells about five per cent of its crops to foreign countries. The only threat to its preeminent position is the never-ending spread of the city, as factories, sub-divisions and shopping centers consume more and more prime agricultural land around the Southern California megalopolis.
Large Landholdings
In the Environs of Los Angeles*

Rodney Steiner**
(California State College at Long Beach)

The countryside around the nation's second-ranking conurbation is a melange of physical settings and kinds of occupance undergoing widespread but erratic rural-to-urban metamorphosis. A neglected aspect, but one promising better understanding, of the oft-bewildering Los Angeles hinterland is its framework of property ownership, a sometimes influential ingredient of both rural settlement and emergent urbanization.1 Pursuing this prospect, the present article offers an exploratory picture of large private rural properties adjacent to Los Angeles, suggesting avenues of more intensive investigation and providing data for comparison with other circum-metropolitan areas. Due to the breadth of its subject, the study is arbitrarily confined to landholdings having a continuous extent of at least two square miles and situated within seventy miles of the Los Angeles civic center. Such properties were identified from public tax assessment records in summer 1964, and the accompanying account stressing ownership and utilization was subsequently compiled from a variety of sources.2

*The writer extends his appreciation to the California State College at Long Beach Foundation and to the National Science Foundation for funds supporting this study; to his faculty colleagues for their helpful suggestions; and to Lawrence Lane for cartographic assistance.

**Dr. Steiner, who took his doctorate at the University of Washington, prepared his master's thesis, Recreation and Watershed Problems in the Southwestern San Gabriel Mountains, California, (Unpublished thesis, University of California, Los Angeles, 1951), partially under the guidance of Professor Zierer.

1 As one regional planner puts it, for example, "Whether property is urbanized depends in a very real way on the desire of the owners . . ." [Willis Miller in Ernest A. Engelbert, ed., The Nature and Control of Urban Dispersal. (Los Angeles: American Institute of Planners, 1960), p. 95]. It is also noteworthy that while Jean Brunhes omitted land ownership from his classic list of the "essential facts" of geography [Human Geography. (Chicago: Rand McNally, abridged and translated 1952 ed.), pp. 35-39], the subject figured prominently in an exemplary case study in the same book [pp. 104-106], as noted by Richard Hartshorne while defending inclusion of non-material cultural features in geographic research [The Nature of Geography, (Lancaster, Pa.: Association of American Geographers, 1939), pp. 206 and 210].

2 These consisted of published and unpublished materials, field observations, and interviews too numerous and fragmentary for complete citation. A preliminary listing of properties was obtained from cadastral maps published by Blackburn Map Co., Los Angeles (1954), Orange County Planning Department (1959), and Los Angeles City Planning Commission (1962). Helpful records were made available by the Bakersfield and Riverside offices of Title Insurance & Trust Co., by Pioneer Title Insurance & Trust Co. San Bernardino, by field offices of the U.S. Agricultural Stabilization & Conservation Service, and by the U.S. Bureau of Land Management. Gratitude for extended interviews is expressed particularly to William R. Barnes, C. J. Barrett, R. A. Brendler, Eursell Cordell, Robert Erro, Richard Hathaway, Blake McCartney, N. L. McFarlane, C. E. Parker, R. G. Percy, and William Snow.
Properties of the prescribed size and location number 120 and occupy nearly one-fourth of the privately-held non-urban hinterland of Los Angeles. Large holdings are generally fewer than small ones and cover less total area (Table 1). The size-frequency distribution of holdings reveals no peculiarities that might be ascribed to minimum land needs for agriculture or to optimum size of units intended for urban subdivision. However, one major irregularity occurs in the form of five outstanding properties that are nearly as extensive as all other holdings combined (Figure 1). The smallest encompasses sixty-one square miles and the largest 300 square miles, and two of the five contain more acreage beyond the seventy-mile zone.

The location of all properties together and separately by size groups appears unrelated to distance from central Los Angeles. More relevant are kinds of physical settings and modes of occupance. Having originated as agricultural units, most holdings are identified with terrain that is smooth to hilly, rather than mountainous, and with climate that is subhumid or semiarid, rather than desert. Such settings are most plentiful in a sector immediately northwest of Los Angeles, where half of the 120 properties are located. Mountain and desert zones contain fewer holdings, due to unpro-

### Table 1. Data on Properties by Size Groups

<table>
<thead>
<tr>
<th>Size In Sq. Mi.</th>
<th>Number</th>
<th>Total Sq. Mi.</th>
<th>Ownership Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5</td>
<td>69</td>
<td>230</td>
<td>2.1b</td>
</tr>
<tr>
<td>5-10</td>
<td>28</td>
<td>200</td>
<td>2.6</td>
</tr>
<tr>
<td>10-15</td>
<td>12</td>
<td>137</td>
<td>2.2</td>
</tr>
<tr>
<td>15-20</td>
<td>6</td>
<td>102</td>
<td>1.8</td>
</tr>
<tr>
<td>61-300</td>
<td>5</td>
<td>688c</td>
<td>1.4</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>1,357</td>
<td></td>
</tr>
</tbody>
</table>

a Average number of owner changes per property since 1900.
b Based on a sample of fifty properties that give an underestimate of the true figure.
c Excluding acreage beyond the 70-mile study area.

...This condition may arise from the physical variety of the present hinterland, but it might also occur even on a fairly uniform surface as in the outskirts of Chicago, where a singular size distribution of rural property persists irrespective of distance from the city until the time of urban subdivision, according to John J. B. Miller, *Open Land in Metropolitan Chicago*, (Chicago: Midwest Open Land Association, 1962), pp. 102-103.

...As noted later, this concentration is augmented by oil-producing holdings. On the other hand, no special political conditions seem to contribute, since large holdings are frequent on both sides of the county boundary involved, and several properties, in fact, overlap the boundary. Neither is proximity to Hollywood as influential as might be imagined. Only one large landholding is identified with a motion picture personality, and only two serve as regular movie production properties, though several working ranches are employed sporadically as film settings.
ductivity and perhaps to widespread presence of public lands. Most major lowlands with historically adequate water supply also lack large properties, having earlier been partitioned into small farming units or urbanized.

Only a modest degree of owner linkage seems to exist among large holdings. Out of 120 properties, 105 appear to have distinct ownership after deductions are made for kinship affiliations and multiple holdings. Ten owners have more than one large property within the area studied, and one owner has four. Multiple properties of an owner are usually situated close together, however, and sometimes they were once part of a single holding. Many larger owners also have numerous parcels too small to be considered in this study, but commonly located in close proximity to the

master holding. Operating ties were not considered here, other than leasing arrangements noted in the later discussion on agriculture.


6 Fragmentation of ownership appears greater here than in some areas that are more purely agricultural; cf. "contiguous kinship" parcels of the Midwest cited by Miller, loc. cit., and integrated family corporations reported by W. H. Wills, Large-Scale Farm Operations in the Upper San Joaquin Valley, California, (Unpub. master's thesis, University of California, Los Angeles, 1953), p. 102.
Origins, Functions, and Stability

A slight majority of properties are pieces of once larger Hispanic land grants. Accordingly, their present boundaries are generally straight but not compass-oriented, following metes-and-bounds lines in a manner frequent for property, roads, and political limits in rural and even in urban coastal Southern California. Land grant properties are often notably unsymmetrical, though it remains to be tested whether they tend to be more or less compact than holdings having public domain origins. Another small group of properties are derived from combinations of land grants or of parts of grants, or from mixtures of land grants with public domain units. Remaining properties occur entirely within public domain sectors of the Los Angeles hinterland. Coinciding closely with areas shunned by Hispanic ranchers because of low grazing value, most large properties on the public domain originated later than land grant holdings. Some were established "whole" directly out of public domain or railroad lands thereupon, while many others were developed by consolidation of homestead and other small patented units, often by one of the original settlers. Public domain properties tend to be smaller and less often agricultural than land grant holdings, due more to natural handicaps, however, than to method of property origin. Properties in the public domain sector are further distinguished by their right-angle, compass-oriented, devious boundaries, and by frequent penetration from enclaves and peninsulas of alien land. In a dozen extreme cases, holdings from the public domain have complete or partial checkerboard dimensions.

Table 2. Number of Properties by Ownership and Productive Use

<table>
<thead>
<tr>
<th>Owner</th>
<th>Agric and Min.</th>
<th>Agric and Urbana</th>
<th>Idle and Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investors</td>
<td>24</td>
<td>3</td>
<td>2b</td>
<td>10</td>
</tr>
<tr>
<td>Mineral Companies</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Basic Ranchers</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Absentee Heirs</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Developers</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Estate Ranchers</td>
<td>8</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>1</td>
<td>1b</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
<td>16</td>
<td>14</td>
<td>10</td>
</tr>
</tbody>
</table>

*Income accrues from partial urban development of property.

Also supported by oil production.

Agriculture and mineral extraction are the primary productive uses of large properties (Table 2). However, visible productive use is by no means synonymous with property function in this region. Probably not over half of all properties are supported chiefly by agriculture or minerals. Many


8 The prevalence of large ranches throughout western United States bespeaks the ease with which such units were historically established out of public domain land when warranted by forage quality. In the study area, also, several extensive ranches occur on areas of former public domain having relatively high grazing capacities.
properties stand idle, and idle or not, many holdings serve primarily as investments. A few may consist of genuine residential estates that temporarily are economic liabilities. Others are supported in varying degrees by piecemeal sale or lease for urban developments, and a number may be held for their favorable effect on the taxation accounts of owners who have outside income. Some properties are in transitional categories in which purposeful management may momentarily be at a minimum. Such variables and intangibles resist full inquiry and easy categorization, but kinds of ownership enumerated in Table 2 are at least suggestive of actual property functions beyond visible use alone, if somewhat dependent on subjective judgment. Functions and uses of landholdings are discussed more fully in later paragraphs.

Ownership and dimensions of large properties have been historically resistant to change. Most holdings achieved their maximum extent early, and their area subsequently has tended to remain fixed or only slightly diminished. Few present owners are descendants of Hispanic settlers, but the fifty-one properties larger than five square miles have averaged only slightly more than two owners each since 1900, and about one-fourth of all properties have seen no ownership change at all in the twentieth century. In general, the larger the property the less frequent its ownership change has been in the past (Table 1), though this relationship has not held in the last few years. Mineral-bearing properties have also tended to have a minimum of ownership fluctuation. Complete ownership history was not obtained for properties smaller than five square miles, but partial data suggest there is more stability in this size group than would be assumed from the economic ease of transferring smaller holdings. At least thirteen properties of two to five square miles have had no ownership change since 1930. Ownership change for properties of five square miles and larger occurred at a fairly steady rate between 1900 and 1960, though somewhat slow in the 1920's and 1950's, and rapid in the 1930's. Between 1960 and 1965, however, one-quarter of the properties larger than five square miles experienced owner turnover as part of the original trend toward urban development. As might be expected, sale of a property appears to be especially likely following the death of its long-time owner.

**Agricultural Usage**

Agriculture, chief motive in formation of the properties, remains their most important productive use. In general, the larger the property the more apt it is to have some agricultural activity and a greater variety of agriculture (Table 3). A majority of present agricultural properties are essentially limited to grazing or to dry farming of grains and beans, while a small number of holdings are devoted chiefly to irrigated crops, primarily orchards.

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9 This allegation is made frequently with respect to smaller rural properties in Southern California and probably also applies to some holdings considered here, though such cases are not readily documented.

vegetables, and alfalfa, and about one-quarter of all agricultural properties combine significant amounts of irrigation with grazing, dry farming, or both. Cattle feedlots are co-dominant with other activities on several holdings.

An estimated 188 square miles of the 120 landholdings are cultivated, apportioned about 139 square miles to dry farming, twenty-eight to orchards, sixteen to vegetables, and five to alfalfa. The remaining eighty-six per cent of the area studied is agriculturally employed strictly for grazing at most, with probably less than half of this acreage having forage quality. All properties together account for roughly one-tenth of orchard and vegetable acreage in the seventy-mile zone, and probably a much greater share of

<table>
<thead>
<tr>
<th>Table 3. Number of Properties by Agricultural System and Size Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominant Agricultural System</td>
</tr>
<tr>
<td>Grazing and/or Dry Farming</td>
</tr>
<tr>
<td>Irrigation, with Grazing and/or Dry Farming</td>
</tr>
<tr>
<td>Irrigation</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td>*Indicates one property having an important feedlot operation.</td>
</tr>
</tbody>
</table>

dry-farmed and grazing land. The group of large properties therefore seems to be agriculturally less intensively used than is normal for the region, a trait related in part to prevailing unirrigable settings. Further, it is the writer's impression that irrigated crops more often occur on small properties and stop at the boundaries of large holdings, than vice-versa. Since property limits seldom coincide with sharp changes in physical environment, it therefore appears that large properties in this region may tend to make less intensive use of equivalent land and water resources than do small holdings.

Farming on most properties studied is not a simple resident-owner operation. Fewer than a score of owners are solely dependent on agricultural production from their single holding, and only thirty owners use their property as a mailing address. A number of holdings have ranchsteads named on topographic maps, and many more are popularly called "ranch" or "rancho," but these appellations do not prove to be reliable indicators of owner residence or degree of attachment. Properties having cultivation tend to resident ownership more than holdings restricted to grazing or non-agricultural uses, and partly because they are more apt to possess agriculture, so do properties of larger size. About two dozen holdings are leased

11 Based on 1959 Census of Agriculture data for three counties most coincident with the study area, compared to the writer's data for large properties in the same counties.
12 Derived from inspection of air photos and of topographic maps having orchard symbols.
in whole or in part to others, mostly for grazing and grain farming,\textsuperscript{13} while three owners themselves lease additional property nearby, and four owners possess grazing permits on adjacent public lands.

The five leading properties provide specific, if imperfectly representative, examples of the variegated and complex agricultural ownership patterns prevailing in the area.\textsuperscript{14} Their owners consist of an open-stock corporation identified particularly with Los Angeles business interests, a subsidiary of an Eastern railroad with a California metals manufacturer, a largely local family-owner corporation controlled by a non-profit foundation, a closed family corporation based in San Francisco, and a trusteeship for descendants of an early-day rancher. Present owners date, respectively, from 1912, 1964, 1864, 1875, and 1883. Three owners have other large rural holdings in California, and only one of the five properties has a traditional owner's home, though all possess operating structures and employee residences. Each holding is at least partly owner-operated, three also include tenant cultivators, and one controls extensive adjacent property under grazing lease.

**MINERAL PRODUCTION**

Extraction of minerals (petroleum, clay, borax, cement, and water) is second in frequency to agriculture as a productive use of large properties. Some one-third of these mineral holdings occur in the northern and eastern portions of the study area, where climate or terrain are unsuited for agriculture; they tend to small sizes, with none exceeding six square miles. A second group of mineral properties, however, lies immediately northwest of Los Angeles, where petroleum deposits and agricultural settings coincide. Oil revenue usually takes precedence on them, but half are owned by "ranchers" rather than by oil companies. Many therefore also have significant irrigation or feedlot production, although on oil company properties agriculture is usually confined to grazing and dry farming by lease operators. Some properties in the oil-agriculture group, which includes two of the five largest landholdings, would probably be equally large and enduring on a basis of agriculture alone, but oil income may well account for persistence of others in urban-exposed locations. Altogether, petroleum-related properties in the study zone number thirty-one and encompass over 500 square miles. Included are more than a dozen holdings without oil production themselves but held by owners having income from oil. These consist mostly of estate ranches or simple investments rather than potential oil fields.

**INVESTMENT-RELATED FUNCTIONS**

It appears that investment is by far the leading motive for ownership of large rural properties around Los Angeles. Consisting of both individuals

\textsuperscript{13} This figure yields a tenancy rate of at least twenty-six per cent, and if each tenant were considered a separate operating unit, the value perhaps would be comparable to the fifty per cent figure reported for one sector of the study area by Howard Gregor, "A Sample Study of the California Ranch," *Annals Association of American Geographers*, Vol. 41, (1951), p. 292.

and organizations, most investors maintain offices in the Los Angeles urban area. Only a few have long-standing affiliation with agriculture, but many have operated in Southern California for several decades. Investor properties understandably have tended to experience frequent transaction; more than half have changed hands since 1950 and only one investor-owner is known to pre-date 1900. There have been few instances of property consolidation by investors (or developers) in recent decades. Rather, the rule has been either no major alteration of pre-existing boundaries following acquisition by an investor, or early partition. Some investor properties, located mainly in mountains or desert, have long stood idle. The majority, however, are in active agricultural use, usually grazing and dry farming. Many were once basic ranches subsequently acquired by investors, possibly indicating that an increasing share of productive rural properties are operated with investment as their prime function. Nearly all purchasers of large properties in the last decade have been investors or developers.

Investment and agriculture are often virtually inseparable, some investors, for example, operating their properties with added motives such as agricultural hobbies. Also, many investor holdings are considered as working properties for immediate, as well as speculative, income. Possibly the intertwining of investment and agriculture has even prolonged the rural status of large properties in Southern California as much as it has led to their subdivision, by giving an added economic buffer against early urbanization not afforded the smaller-scale, narrowly agricultural owner. When viewing the accretion of wealth and population in Southern California, it may seem remarkable that any ranches at all would have escaped the hands of investors. In part this may testify to the power of tradition and sentiment as factors in land tenure but it might also be suggested that even the purest of ranchers nowadays necessarily finds himself a conscious investor merely through the circumstances of rising land values. Many pioneer ranchers of Southern California even in the previous century, in fact, had the reputation of being speculators as well as agriculturists.

In addition to properties clearly identified with investors are those held by absentee heirs and estate ranchers, as recognized in Table 2, and considered here as somewhat special forms of investment orientation. Descendants of pioneer ranchers who live away from the property and have economic interests elsewhere are a common category of owner, and their holdings include some of the largest properties, including six that exceed

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17 Personal motives for continuing to farm on the urban fringe of Los Angeles, some of them seemingly applicable to landholdings considered here, were investigated by Herbert Eder, *Some Aspects of the Persistence of Agriculture in the San Fernando Valley*, (Unpublished master's thesis, University of California, Los Angeles, 1960). pp. 68-70 and 91-98.
ten square miles. Agriculture, mainly of a casual nature, normally occurs on holdings of absentee heirs, and three have important oil output, one is experiencing initial urbanization, and one is being sold a parcel at a time to developers. Estate ranches, on the other hand, serve foremost as temporary or permanent places of residence for their owners, who in turn have outside sources of income. These properties tend to be active and well-managed, with considerable agricultural production, even if seldom self-supporting. Like properties of absentee heirs, estates range widely in size and location, though both groups are absent from desert settings. All estate owners have been present for more than a decade and at least half date back to World War II or before. Their fortunes stem from Eastern manufacturing, Southern California petroleum (not, however, on the estate itself), or from various activities in Los Angeles.

**Urban Development**

Continuing a traditional process, present-day properties are one by one becoming candidates for urbanization. Within the past few years, a dozen of the 120 "rural" holdings have experienced partial subdivision, and population on these lands alone in the next two decades is projected at upwards of one-half million. Another twenty properties are expected to begin urbanizing shortly, so that in the near future at least one out of four present large rural holdings within seventy miles of Los Angeles will probably contain housing tracts.\(^{18}\) Timing of urbanization is related partly to nature of ownership, since holdings purchased by developers in recent years have usually been those held lightly—that is, by heirs or investors rather than by basic or estate ranchers. Subdivision, however, is occurring on properties varying greatly in size, setting, use, and ownership, suggesting that most landholdings may ultimately undergo at least partial urbanization.

None of the 120 properties is fully urbanized as yet, and plans for some holdings call for continued rural use where terrain is difficult for construction or where intensive agriculture or oil production already exist. On larger properties, complete urbanization also may be long in coming simply due to market limitations, so that it is often to the owner's advantage to maintain maximum agricultural income for the present.\(^{19}\) There is only a very rough parallel between proximity to Los Angeles and proportion of holdings experiencing urbanization, even making allowance for mineral and other properties unattractive for early subdivision. A closer relationship might well occur were it not for such local variables as site quality, availability of imported water, access, and size of holding. The larger the property,

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\(^{18}\) Available data when projected indicate that the 120 properties will accommodate between one-tenth and one-third of the anticipated new population in the next two decades; in other words a notably smaller proportion than is their present share of privately-owned open space in the seventy-mile zone.

\(^{19}\) An additional motive for delaying urban development arises out of recent state legislation providing incentive payments to farmers who wish to postpone subdivision of their property. Provisions of the new law, the effects of which are not yet locally apparent, are described in J. Herbert Snyder, "A New Program for Agricultural Land Use Stabilization: The California Land Conservation Act of 1965," *Land Economics*, XLII (February, 1966), pp. 29-42.
the more likely is development to be occurring or imminent, though the reverse may be true with respect to the average urbanized share of a given holding. Either way, large properties that happen to lag behind the pace of urbanization in their particular locality appear to stand out more conspicuously on the local landscape, and with possibly further-reaching effects, than holdings equally persistent but smaller and more dispersed.

**EVALUATION AND APPLICATIONS**

Large landholdings not only occupy an impressive extent of rural Southern California, but they may also be commended as type examples for some characteristics of the region, since they involve a wide range of physical sites, land uses, general locations, and kinds of ownership. More specifically, the group of properties two to five square miles in size appear to be regionally normal in the proportion of their cultivated land that is irrigated. Large properties are perhaps also representative in regard to frequency of holdings having mineral production and broad tendency for urbanization to increase with proximity to Los Angeles, since in both respects few differences were found among various property size groups, raising the possibility of equivalency also with properties of more normal size. In other ways, however, large landholdings seem to form a unique component of Southern California. Evidence from this study suggests that size of property may correlate positively with: (1) land grant origins and historic stability of ownership, (2) variety of natural and man-made landscapes and productive activities, (3) dominance of extensive over intensive agriculture for a given quality of land resource, (5) presence of urbanization, and (6) degree of agricultural persistence on properties where urbanization is commencing.

Because agriculture is the primary productive use of large properties, their study inevitably touches upon this segment of the Southern California economy and landscape. Some representative and some unique qualities of large holdings, agriculturally speaking, have already been suggested. Additionally, major properties may also deserve further attention because they frequently involve multiple operations based on having both irrigable and unirrigable segments, in contrast to the prevailing single-setting, single-system type of farm enterprise. Future studies of detailed agricultural operations on large ranches could profitably be done on a case basis; or

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20 The reasons, though unclear, seem unrelated to distance from Los Angeles, internal site qualities, or class of ownership. Superior access or various economic attributes of large units may be involved. In any event, the present observation counters an earlier implication (Steiner, *op. cit.*, p. 359) that larger rural holdings may inherently have more effective qualities of self-preservation than smaller properties. The opposite, in fact, can be true to the extent large holdings offer greater efficiencies to the developer or easier acquisition by him. The latter is suggested as a historically significant process by R. H. Allen, “The Spanish Land Grant System as an Influence in the Agricultural Development of California,” *Agricultural History*, Vol. 9, (1935), p. 136.

21 The importance of persistent large rural landholdings goes beyond the immediate locale, in that would-be urbanization may thereby be directed into some distant sectors and precluded from others, as in the major case described by Richard Bigger *et. al.*, *Metropolitan Coast,* (Los Angeles: Bureau of Governmental Research, University of California, 1958), pp. 68-69.
organized topically, they could clarify questions such as the difference between ownership units and operating units in this region.

The present study also sought to detect influences of the city upon its rural hinterland by comparing properties grouped according to location in successive ten-mile rings outward from Los Angeles, but no consistent gradients of property size, kinds of ownership, or agricultural land uses were observed. Partly, the locale was less than ideal for the purpose, due to its physical diversity. Also, a study area extending more than seventy miles out might have been more revealing, in spite of complications from overlapping hinterlands. On the other hand, many aspects of rural ownership and use may not usually be gradational outward from American cities, and thus the present study may have demonstrated some normative, rather than unique, qualities of rural Southern California, though adequate confirmation awaits inspection of other metropolitan hinterlands.
THE SOUTHERN LIMITS OF THE MOHAVE DESERT, CALIFORNIA

VINCENT G. MAZZUCHELLI*
Systems Development Corp., Santa Monica

Most geographers can locate the Mohave Desert with little or no difficulty; however, if asked to define its limits, particularly in relationship to the Colorado Desert on the south, most would find it difficult to do so. The purposes of this brief paper are to reassess the varying arguments for the southern limits of the Mohave Desert, to clarify the relationships between certain place names — e.g., the Great Basin, the Sonoran Desert, the Colorado Desert — and the Mohave, and to delimit in a series of maps the desert regions under discussion.

Brewer,1 writing in 1889, included most of Southern California, with the exception of the Transverse and Peninsular Ranges and of that area immediate to the Colorado River, within what he designated as the “Great Basin” (Figure 1, Plate A). He described the area in these terms:

The Great Basin is the name popularly applied to a region of the Western United States lying between the Sierra Nevada and the Wasatch Mountains. It has no one single character which does not belong to some other portion of the globe, yet it constitutes the most distinctive geographical feature of the North American continent. It is an area of interior drainage, that is, none of the streams flow to the sea.

Fenneman,2 in his organization of the physiographic divisions of the United States (Figure 1, Plate B), included Brewer’s “Great Basin” within the “Basin and Range Province,” which he described in 1931 as follows:

Topographically it [the Basin and Range Province] is distinguished by isolated, roughly parallel mountain ranges separated by desert basins, generally almost level. ... Much of the area there has slopes on which water runs directly to the sea but it is too arid to supply continuous flow and considerable areas have no run-off at all.

The ostensible anomaly of Brewer’s argument for internal drainage and Fenneman’s for external drainage is more apparent than real; it is actually a function of the areas included in either delimitation.

Fenneman’s organization, later in time than that of Brewer, was based on a considerably greater body of geologic knowledge of the area and is, consequently, sharper in detail. He divided the Basin and Range Province into five sections (Figure 1, Plate B): the Great Basin, the Sonoran Desert, the Salton Trough, the Mexican Highland, and the Sacramento Section. Our discussion shall be limited to the Sonoran Desert section, which Fenneman3 defined as including the Gila Desert of southwestern Arizona and the

*Mr. Mazzucchelli, a UCLA doctoral candidate, has a long-standing interest in deserts. He was aide-de-camp to Professor Zierer in matters cartographic for the latter’s text, California and the Southwest, as well as the cartographer of several maps in the volume. He is presently a cartography supervisor.


3 Ibid., p. 367.
THE GREAT BASIN

by
WILLIAM BREWER

THE BASIN AND RANGE PROVINCE

by
NEVIN FENNEMAN
Mohave Desert of southeastern California, and which he distinguished from the other four sections of the province on the basis of the following criteria:

In common with the Great Basin, this extensive area is characterized by basin ranges and intervening desert plains. In contrast, however, the altitude is lower, the ranges are smaller and occupy not more than a fifth of the area. Rock pediments are much more prevalent and undrained basins are less general.

An insignificant portion of the plain surface lies above 3,000 ft. and more than half of it is below 2,000. A large fraction lies between sea-level and the 1,000-ft. contour. In a very general way the level declines from all directions toward the Gulf of California.

At this point it is well to note that Fenneman's Salton Trough section has been variously described (Figure 2) by other scholars as the Colorado Desert. Blake, in a report to the Congress in the early 1850's, noted that the Colorado Desert

... extends from the base of Mount San Bernardino to the head of the Gulf of California and is separated from the coast-slope by the Peninsula Mountains. The limits of the plain on the north and northeast are determined by ranges of mountains which extend from San Bernardino Mountain to the mount of the Gila and beyond into Sonora.

This view was restated by Orcutt in 1890, Barrows in 1900, Cecil-Stephens in 1901, and Cockerell in 1945. Cecil-Stephens' delimitation of the eastern boundary of the Colorado Desert is somewhat more sharply drawn than those of other scholars; he delimits it from "... a spur of the Sierra Madre, which runs south-easterly about 180 miles to the Colorado River, at an average altitude of 4,000 feet." Jaeger suggested that the Colorado Desert encompasses not only the Salton Trough (of Fenneman's classification) but also that segment of the Sonoran Desert which Fenneman refers to as the Mohave Desert sub-section of the Sonoran Desert. He further argued that

The Colorado Desert includes not only the area immediately contiguous to the Colorado River but also the Salton Basin and the rather low-lying bordering areas which drain into the Salton Sink. This agree well with the conception of W. P. Blake, who first gave the Colorado Desert its name in 1853. From the biological standpoint the northern limit of the Colorado Desert may be arbitrarily placed as far north as a line drawn from the Morongo Pass [i.e., between the San Bernardino and the Little San Bernardino mountains] easterly to the Colorado River.

Thus far we have shown that Fenneman's Salton Trough may be termed the Colorado Desert and that, whatever the name, this area is used

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by Fenneman to represent the southwestern boundary of the Sonoran Desert section.

Other scholars, however, have not been able to clearly define the southwestern boundary of the Sonoran Desert (i.e., Mohave Desert) (Figure 3). For example, Loew,\(^\text{11}\) in 1876, delimited the Mohave Desert as "... comprising southeastern California and the southwestern corner of Mexico. Lower California, although a portion of Mexico, belongs geographically to the Mohave Desert." He included to the Salton Trough (or Colorado Desert) within the Mohave Desert. Baker,\(^\text{12}\) writing in 1911, asserted that

The Mohave Desert Region comprises the extreme southwestern portion of the Great Basin. It lies entirely within the State of California and includes within its limits portions if the four counties of San Bernardino, Inyo, Kern and Los Angeles. Its boundaries on the northwest are the Tehachapi Range; on the southwest are Sawmill Mountain, Liebre Mountain, the Sierra Pelona, with their southeastern continuation to the head of the Santa Clara River, and the San Gabriel Range; on the south are the San Bernardino Range and the Colorado Desert; on the southeast the natural boundary is the divide between the drainage tributary of the Gulf of California and interior drainage of the Great Basin.

Another delimitation of the Mohave Desert was provided by Abrams\(^\text{13}\) who noted that it

... extends from the eastern base of the Sierra Nevada eastward through the Death valley region to the Virgin River Valley, in the extreme southwestern part of Utah and the northwest corner of Arizona. To the southward it spreads over the great barren wastes if the desert slopes of the San Bernardino Mountains and their eastern spur, the Chuckawalla Mountains.

In 1929, Thompson\(^\text{14}\) expanded upon Abrams' nomenclature, to wit:

It is desirable ... to have a term by which the entire region ... can be designated. For convenience, therefore, the term "Mohave Desert Region" is used as applying to the entire region [i.e., as far south as the 34th parallel] ... except the settled region south of the San Gabriel and San Bernardino Mountains.

A few years later Gale\(^\text{15}\) produced a relief map on which physiographic regions of California were shown. Therein the Mohave Desert included that portion of California south of the Garlock fault, north of the San Andreas fault, and north of the East Mesa of the Imperial Valley (southern edge of the Little San Bernardino and Chocolate Mountains):

14 Thompson, op. cit., p. 6.
Figure 3

THE SOUTHERN LIMITS OF THE MOHAVE DESERT

OSCAR LOEW, 1876

CHARLES BAKER, 1911
LEROY ABRAMS, 1915
HOYT GALE, 1933

DAVID THOMPSON, 1929

RICHARD JAHNS, 1934

THANE McCULLOCH, 1934

MILES

10 5 0 10 20 30 40
In more recent years three scholars in a symposium study of Southern California attempted delimitations of the desert region. Hewett\textsuperscript{16} delimited the Mohave in its southwestern portion by the San Andreas fault, but did not attempt to define the southeastern boundary. Jahns,\textsuperscript{17} in the fashion of Gale, distinguished between the Colorado Desert and the Mohave on the basis of the southern edge of the Little San Bernadino-Chocolate Mountains line. By means of a line roughly corresponding to the 115th meridian and the 34th parallel, McCulloch\textsuperscript{18} delimited, respectively, the eastern and southern bounds of the Mohave Desert.

After nearly a century of inquiry there is still little unanimity of opinion. Two boundary lines continue to be argued as representing the southern extent of the Mohave Desert subsection of Fenneman’s Sonoran Desert section: 1) along the 34th parallel, and 2) along the southern face of the Little San Bernardino and Chocolate Mountains. In contrast, there seems to be more agreement that the Little San Bernardino-Chocolate Mountains line sets the northern limit of the Colorado Desert.


THE ROLE OF THE STATE IN THE MODERNIZATION OF RURAL AREAS:
A Case Study From New Zealand’s Northern Province*

GORDON J. FIELDING**

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In all nations surrounding the Pacific Basin there are areas in which the levels of living lag significantly behind the nation as a whole. Such areas are not restricted to developing nations. In fact, the level of living is more disparate and the people psychologically more frustrated in developed nations. Normally, they are agricultural regions, although there are instances where the decline of mineral exploitation is partially responsible for the maladjustment between population and resources. In these stranded areas, the people are incapable or unwilling to adjust to changing economic conditions. A sense of hopelessness pervades, which blights the progress of all. Changes must be motivated from beyond the region, and in democratic societies it is the state which generally accepts this role.

The state recognizes that the market process is biased; it rewards the proficient at the expense of the inefficient. Yet people are equal, and for this reason, people in economically stranded regions warrant special assistance programs so as to enable them to raise their level of productivity and to participate as equals in the nation’s economy. The state, therefore, acts as an intermediary between the inequality of the market process and the principle of personal equality.

A wide range of direct and indirect political programs are used to assist development of economically stranded, or what I prefer to call marginal, areas. Some programs are nation-wide, whereas others apply specifically to the marginal area.

This article examines the contribution of the state to the modernization of a rural area in northern New Zealand. Principal programs are analyzed

*This paper was read as part of the symposium: “Modernization of Rural Areas,” Eleventh Pacific Science Congress, Tokyo, Japan, August 25, 1966.

**It is appropriate that I should contribute thoughts on political influence in geographical change in a Festschrift in honor of Clifford M. Zierer, as it was Dr. Zierer who first drew my attention to the influence of politics on the process of environmental change. I well remember that day in the hallway of Haines Hall when he commented upon my field project for my doctoral qualifying examination by saying “Sound techniques and description, but you failed to appreciate the influence of the political boundary between Los Angeles City and Los Angeles County.” This boundary passed through the center of the study area in the San Fernando Valley and explained much of the variation in the agricultural landscape. It was a valuable lesson, for, with subsequent nurture about the coffee-pot-cultural-center at UCLA, I have become increasingly interested in political influences as a process of environmental change. [Dr. Fielding’s dissertation dealt with Dairying in the Los Angeles Milkshed: Factors Affecting Character and Location, (U.C.L.A., 1961)]. Clifford Zierer’s pioneer contributions to the geography of cities in this region, his years of teaching Pacific courses and his efforts to ensure that the UCLA Library become a repository for South Pacific publications, have provided fellow geographers and students with a better appreciation of this region.

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Figure 1. Study Case from New Zealand, Northern Province
and a hypothesis is advanced which outlines a preferred organization for regional planning and development.

Analyzing the role of the state in agricultural change is complicated by the varying motives involved. Superficially it is an economic problem: that is, improving the level of living of farm operators and increasing regional and national output. However, political action is frequently motivated by the prospect of increased political influence in economically marginal but politically influential areas. For this reason political, rather than economic, solutions are sought, although in the public presentation of policy, economic values are emphasized. Failure to accomplish economic goals is not uncommon nor unexpected, for the state is both operating in areas where private investors are unwilling to participate, and with objectives which are not exclusively economic. For this reason, it behooves social scientists concerned with the role of the state in economic development to evaluate programs so as to provide society with reliable assessments of the alternatives.

Recognition of the political motive in programs for the redevelopment of marginal farming regions is essential. Most uneconomic farms are in marginal regions, for in the more productive regions, normal market procedures result in the absorption of uneconomic units by more efficient operators. But, in the short run and from a national point of view, greater return from capital could be achieved on investment for the further improvement of farms in the most productive districts, rather than in marginal areas. In the long run, capital improvements ancillary to, yet necessary for, the development of agriculture in marginal areas can be amortized. The time period is not short. For this reason, investment in redevelopment of marginal areas must be recognized as a social, as well as an economic, investment. This complicates the use of rational methods of economic evaluation unless the social necessity for assisting these regions is recognized.

**Northland Example**

There are three marginal agricultural regions in New Zealand: Northland, East Coast and the Nelson-West Coast (Figure 1). Each is somewhat isolated, both physically and in terms of communication from the centers of economic activity. Out-migration has been a feature of each, and all three have had special programs of economic assistance developed for them. For our present purposes either Northland or the East Coast would provide a suitable example. In both, farmers operate within the constraints of a difficult physical environment, both have a long history of agricultural development which has known more prosperous periods, and both have a higher proportion of Maori land and Maori farmers than the national average.

Northland was chosen because of the writers better acquaintance with the area and because of the promise it holds as a pastoral farming region. A promise which has begun to be realized, due in part to the assistance provided by the state.

Farming in Northland is a difficult, frequently frustrating enterprise. Each farmer has to manage a range of problem soils, frequently of low inherent fertility. Summer droughts are common, and in plagues of crickets, army worms, and grass grubs ravage pastures. In addition to the physical and biological burdens, there are economic and social problems. Distance
and poor access, especially in the far northern counties, increase the cost of marketing produce. Relative isolation has also retarded the diffusion of progressive farm management techniques common in other farming areas. For example, only sixty per cent of the cultivated area is top-dressed and a much smaller proportion receives an annual application. Even in the latter case, the amount applied is seldom sufficient.

Lack of capital is the primary obstacle to a more effective utilization of land resources. The change from farming as a way of life to farming as a business operation can only be achieved through the adoption of new techniques and the use of mechanical aids in the place of labor. Capital reserves, so essential for such change, are seldom accumulated in the semi-subsistence way of farm life which prevails. Normal lending institutions are unwilling to loan money to farmers without considerable collateral, because of the uncertainty of agricultural returns. In addition, some of the most ambitious farmers are inexperienced. Many have come to farming from other employment and with little capital. They have chosen land in Northland because of its lower cost and with no foresight of the difficulties involved in local land development. They are willing workers but need constant supervision and budget advice if they are to complete a development plan successfully. Banks, insurance companies, stock and station agents and even the State Advances Corporation are unwilling to provide either the capital or the supervision required.

A measure of the agricultural problems in Northland is provided by the number of uneconomic farming units. The Department of Agriculture's Survey of North Auckland Dairy Farms in 1962 showed that 40 per cent of the 5400 farms supplying factories produced less than 10,000 pounds of butter-fat. As the average net income of farms producing from 10,000 to 12,000 pounds butter-fat was estimated at $2,000, it is clear that several hundred Northland farms are yielding their owners incomes far below that acceptable to most New Zealanders. A study is currently in progress (1966) surveying sheep farms in Northland and provisional results indicate that approximately one-fourth of these farms are also uneconomic. As a conservative estimate, then, it is probable that one-third of the 10,000 farms in the region are uneconomic.

Northland's economic lag is due to a paucity of social and economic investment rather than the result of the niggardly physical environment. True, problem soils and insect and fungal pest create seasonal depredations, but the scientific knowledge and the mechanical and managerial methods to overcome practically all of these problems are available. The critical deficit is the low level of managerial ability displayed by most farmers. They cannot effectively utilize the techniques available to them, and because of the low level of achievement they do not possess the financial resources to provide security for farm redevelopment borrowing once they recognize the advantage of new methods.

The climate with its regular rain, humidity, warmth and minimum of frost, is ideally suited for pasture production given the knowledge to combat environmental problems. It, is, in fact, possible to produce a greater volume of dry matter per acre from pasture in this region than elsewhere in the nation. And since New Zealand's agriculture in the foreseeable future will con-
continue to rest on the productivity of pasture grasses, this is a resource of paramount importance for regional development.

In addition to pastureland capable of improvement there are extensive areas of idle, scrub-covered land suited to development on adjoining and within existing farms. The National Resources Survey estimates that there are more than one million acres capable of development north of Rodney County.\(^1\) In a more detailed study of Mangonui County, Murray indicates that 173,000 acres presently idle could be developed.\(^2\) More than half this acreage is within existing holdings. On the average, the grassed area of holdings constitutes only one-half of the total area.

For a century the agricultural advantages of Northland have been largely ignored. Early pioneers lacked the knowledge to cope with the difficult environment. Many enterprises failed, and the undeserved reputation of a poor agricultural region has persisted. Despite this history, agriculture is the basic resource of the region, and the whole economy reflects the state of agricultural development—marginal with considerable untapped resources.

Out-migration of people and comparatively low per capita incomes have resulted from the failure to develop regional resources. Local commercial leaders recognized the influence of this condition upon their investments and have on various occasions petitioned the government for assistance to agriculture. The government faced three alternatives: 1) they could do nothing and aid the resettlement of migrants in areas of rapid economic development, 2) they could encourage economic activities other than agriculture, or 3) they could assist the development of agriculture. All three alternatives have been practiced, but in this discussion we are concerned with only the latter.

The government’s participation in agricultural development has been justified on economic grounds. However, its intervention has been precipitated by the wish to placate local leaders and to strengthen electoral power rather than to merely improve the regional and national economy. Any evaluation of the program needs to be mindful of this motive.

For this reason no comprehensive program of regional agricultural development in Northland has been introduced although such programs have been proposed.\(^3\) Instead of a rational program, the state has preferred to modify well tested programs of direct and indirect assistance to land development and to encourage their application in Northland through budgetary control. They have followed an incremental approach to policy making and planning as outlined by Lindblom rather than the rational approach presented by Banfield.\(^4\) And because the motives were more political

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than economic the state has preferred indirect rather than direct programs of agricultural development; that is, through financial incentives they have preferred to encourage farmers to carry out development programs rather than allow state agencies to participate. The one exception is in the development of problem land where the costs of development and the length of time before satisfactory returns can be achieved precluded most individual investors.\(^\text{5}\)

It is the writer’s belief that it matters little whether direct or indirect assistance is used. The critical factor underlying the relative success of programs for improving the agricultural economy is whether or not the program is controlled within the marginal region. Centralized control of economic development, at least in the New Zealand experience is unsatisfactory.

Accordingly, this paper advances the thesis that the most efficient way for the state to revitalize the economy of a marginal area is to organize assistance through a local redevelopment authority. The various programs utilized in Northland will be considered in relation to this statement.

A regional authority for rural development requires a nominated board and a permanent technical advisory staff. Its purpose should be to coordinate the resources provided by the state and utilize them in a flexible manner to encourage individuals to improve their level of attainment. Such an organization should be controlled by persons appointed because of their familiarity with local problems and staffed by those capable of evaluating the costs and benefits of alternative approaches, as well as feasibility of an individual benefitting from state assistance.

The key to the modernization of rural areas is to obtain the cooperation of the man operating the land. Unless he is willing to cooperate, no amount of incentive the state provides will be effective in inducing farmers to increase output and raise levels of living. And farmers, as diffusion theory has demonstrated, are unwilling innovators. They seldom take the advice freely given by specialists. Local opinion leaders among the farmers are much more influential in implementing change. Therefore, it is a wise strategy which involves local opinion leaders in the policy-making structure. Also, there are some farmers who are not capable of raising levels of output. They are frequently trapped on their farms by overwhelmingly burden of debt but without the skill to engage in any other enterprise. They are equipped neither socially nor psychologically for the responsibilities of independent management. A local development authority can usually identify such persons, and if a flexible approach to problem-solving is allowed, subsidized migration and vocational redirection is probably the best solution. Centralized planning tends to overlook the individual. When he is inefficient he is kept on the land with costly subsidies. When he is efficient he is frustrated by regulations and an inflexible approach to his particular requirements.

A development authority of the type here outlined does not exist in Northland. However, some of the assistance programs introduced do pro-

\(^5\) An alternative would have been to encourage land companies to undertake development. However, the philosophy of ‘one man, one farm’ has been strong in New Zealand, and progressive land and income taxes discriminate against large holdings. Contemporary opinion is more favorable to such land enterprises although the deterrent taxes remain.
vide for a measure of local control, and it is upon the writer's evaluation of these programs that the thesis is based. They appear to have been more successful in remedying agricultural problems, and they probably would have been even more so had a multiple aid strategy been possible, involving all, or part of, the wide range of state assistance programs available.

The various state assistance programs are discussed under two headings: those which are coordinated at the local level and those which are not. They are presented more from the point of view of clarifying the thesis rather than of documentation.

**Decentralized Assistance Programs**

Decentralized programs operate with funds allocated on an areal basis by the state treasury. Use of the funds within a particular area is left to local administrators who function within broad constraints set by the state. Three programs are operated in this manner: marginal lands assistance, development of problem lands, and agricultural research. Only marginal land assistance has an appointed regional board of control of the type outlined in the thesis statement. The other two are directed by state departments. However, in both instances a higher degree of regional autonomy exists.

Under the Marginal Land Act of 1950 the state introduced the principle of lending capital to farmers willing to further develop their properties, but who had hitherto been handicapped by lack of finance. Interest is slightly below the prevailing rate. The principal advantage is that loans are granted to those who have the physical and human capacity for increasing production but lack the financial collateral. It is a condition that applicants must have previously refused assistance from normal lending institutions. Their application is carefully examined by an appointed board consisting of local farmers and financial and agricultural advisors. The board is primarily concerned with the ability of the individual and the feasibility of the development proposal. Their primary purpose is to ascertain whether the applicant, aside from current mortgage commitments, is capable of successfully completing the development plan. Emphasis is upon an evaluation of the personal capability of the applicant by a committee conversant with local conditions. In economic planning usually the personal factor is overlooked by political agencies, yet it is the key to infusing vitality into a depressed agricultural region. And for an area like Northland, where lending institutions have been cautious in farm investment because of the many local problems associated with agriculture, the shift of emphasis from land to man is significant.

The results of the program in Northland have been commendable. Between 1951 and 1963, 4.75 million dollars have been loaned to 325 farmers. In addition to the buildings constructed, loans have enabled the sowing of 30,000 acres of new grass and the rotation of 19,000 acres. In numerous instances carrying capacities of properties assisted have doubled and production trebled. And what is more important, the social fabric has been transformed in those areas where farmers have taken advantage of the

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scheme. Faith in a profitable agricultural enterprise has been restored in areas where many had come to accept a semi-subsistence way of life. As agriculture is the primary economic base of the region, this spirit has been infused into the whole society.

The Northland region is organized into three districts for supervision of the Act. Each district has its advisory committee consisting of experienced farmers from the area together with agricultural specialists. Members selected from each district committee constitute the regional advisory board. Before considering a loan application the district committee visits the applicant's farm and assesses the feasibility of the development program and the likelihood of the applicant completing the program. The committees realize that, although the physical elements present many difficulties in this region, it is the human element which currently obstructs optimum development. Whenever they discover individuals who have the necessary capacity and energy to complete a development scheme, then they have the power to recommend loans which were not available from normal lending institutions at comparable rates of interest.

In many cases committees have found the farmer requesting assistance incapable of completing the development proposal. Either the farm unit is too small to be efficient or the land is unsuited to more intensive pastoral farming. In other instances the individual has been incompetent. Unfortunately the committee can do little to assist men in such plight. For this reason it is recommended that regional authorities should be established on a basis similar to those constituted for marginal lands assistance, but they should be able to coordinate the various state assistance programs rather than be restricted to a single program. They could then recommend a wider range of alternatives: use of the land for forestry rather than farming, enlargement of the property through purchase of additional land, or the subsidization of the farmer out of agricultural enterprise all warrant consideration for specific cases.

A recommendation of this nature recognizes the limited scope of a government in a democratic society to strengthen the economy of a marginal area through direct action. The government must work through the existing landowners by providing incentives for them to effect the necessary changes. Its approach must be indirect. Subsidies could be used to supplement rural income. However, this does not solve the problem of incorporating the region as a viable element in the national economy. Direct intervention is, of course, necessary where private enterprise will not or cannot undertake the task of development. The development of problem land is one such instance.

**Development of Problem Areas**

By the early 1930's most of the attractive land in New Zealand had been alienated. Only the difficult land remained unoccupied, and most of this was either Crown or Maori land. And yet, as a comparatively young, post-colonial nation, the pioneer spirit was strong. Men wanted land, but as Bowman stated in his classic work, "Men hunger for land only when they can get it under favorable conditions." The state recognized the desire, for

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it enacted, in 1929, the Land Laws Amendment Act which provided for expenditure of funds in order to develop Crown Land for settlement. Development of Maori Land was authorized by a separate act, and until recently this development has proceeded in similar manner although under different departmental control. Both programs are now controlled by the Lands and Survey Department.

Because the costs involved in the development of the problem land and the length of time before satisfactory returns could be achieved, individuals were unwilling to undertake development. The state recognized the need for developing the land and was willing to sustain the cost. However, through economies achieved by a large-scale operation, the application of the most recent scientific achievements, and sound management of the program at the district level, the state has been able to develop and settle such land at no cost to the taxpayer.

Although the program is administered by the Lands and Survey Department, the principle of regional independence is fostered. Each district supervisor of land development is encouraged to use financial resources in a flexible manner so as to overcome the special development of each block of land. Four categories of land in Northland resisted earlier attempts at settlement: 1) the dug-over gumlands 2) the ironstone lands with impermeable soils 3) the steep hill country, and 4) the recently stabilized sand dunes. These land types differ from the land developed under the same program in central North Island and in Southland. In addition, each type exhibits considerable variety within the region. Without regional independence and encouragement of a flexible development program on each block, the program would not have been as successful. The development of Maori Land, which until recently was controlled by the Maori Affairs Department, suffered as a result of inflexible management policies. Its achievements were limited. Admittedly, in the development of Maori Land special tenure problems were encountered which have not bothered developers of Crown Land.

Although the state land development program was authorized in 1929, little was achieved between 1930 and 1950 in Northland and, in fact, in the entire dominion. The Great Depression curtailed developmental finance, and essential material was not available during the war. Available finance was used for the subdivision and improvement of estates for closer settlement. Development of unimproved and seriously reverted land in Northland was delayed until after 1950. Including the land settled through the subdivision of estates, 435 farmers were settled on 104,579 acres of land between 1941 and 1965. Some 236,521 acres are currently under development, of which 185,885 are for general settlement and 50,636 are being developed for the Maori Affairs Department. The current policy is to grass an additional 10,000 acres annually in Northland. Development areas are scattered in relatively small blocks throughout the entire peninsula (Figure 1). The exception is the 72,000 acres under development in the northernmost peninsulas of Mangonui County.

Large-scale and capital-intensive methods are used to develop the problem land. Development begins with the clearing of secondary growth
by fire and/or mechanical means. Where feasible the land is cultivated before sowing, but where the land is steep, fertilizer and grass seed are spread by aeroplane onto an ash seed-bed. Intensive stocking with beef cattle for short periods is practiced in the initial stages of pasture establishment. As the pasture is consolidated, the vestiges of secondary growth are removed by hungry animals.

The initial stages of development—clearing, pasture sowing, and elimination of undesired vegetation—can be accomplished within two years. The gradual build-up of fertility by annual applications of fertilizer and skilled stock and pasture management is a longer operation. Five to eight years may be necessary. Only when the land is capable of supporting a high level of production are the blocks subdivided and buildings erected for settlement of individual farmers.

The costs of development are not low, although the state is able to develop and sell the land without a loss. In Northland the estimated gross development cost per acre is $115 for sheep farms and $180 for dairy. Disposal price of farms is $84 per acre for sheep properties and $160 for dairy. The difference, together with interest at the rate of four per cent on the capital invested, is recovered from farming profits during the development stage.

By converting idle land into farms the state is able to increase the productive capacity of the region and the costs amortized by the project itself. In addition, land is available for those who desire it and have the necessary skill to utilize it profitably. Agricultural contractors share in the development project, and the local community benefits from increased demands for farm inputs and services.

The program for the development of Maori Land closely resembles that already described. In the development stage a longer period of operation by the state is usual. This further reduces the disposal cost, so that Maori farmers, who in general have less capital, are able to enter farming without undue financial burden. Occupiers are generally selected from the tribe owning the land, but, as Ishida has shown, the level of achievement is higher where occupiers are selected from a wider area.

In general, land development by the state in Northland has been successful. This success has in no small measure been due to the flexible management policy under which the program has operated. The program was neither new nor specifically adapted to Northland. It has utilized a long established state function which has proved successful in other areas.

Stock and equipment losses have at times been embarrassing, for they are publically linked with the likelihood of lax management in state operated enterprise, although similar losses are not unknown, albeit seldom advertised, in company operations.

One failure has been the shortsightedness of the settlement policy. Because of the government's desire to involve as many settlers as possible in the benefits of the developments, blocks have been subdivided into minimum-sized family units. As farming techniques have improved, farmers have not had sufficient land to fully benefit from labor-saving devices. Faced with stable returns, but increasing costs, many farmers have unwise­ly increased their indebtedness through borrowing. Properties become hopeless­ly encumbered and their owners disillusioned and stranded without full-time productive employment on their properties.

Apart for some noticeable exceptions, productivity per acre on settled areas is lower than that on adjoining development blocks. The primary reason is the failure of settlers to apply adequate annual dressings of artificial fertilizer—the key to grassland farming on the impoverished Northland soils. Fertilizers and pesticides tend to be the first items of the farm budget curtailed, when they ought to be the last. And if they should apply the fertilizer and the season is favorable, new settlers seldom have the resources to enable them to increase stock capacity in order to capitalize on the grass growth before it is wasted. Capital and superior management ability are scarce resources in Northland. The state development blocks have them, but few settlers possess either and many lack both.

Recognition of the paucity of managerial ability and of its primary role in a difficult-to-farm sub-tropical environment has resulted in the recommendation that the blocks be operated as large-scale company farms. Individuals would contract to perform certain services, but capital and management could be coordinated by central decision-making. Such recommendations come from those primarily concerned with the urgent need to increase agricultural production in New Zealand. The evidence tends to support their assertions. However, it is necessary to recognize the motive for government participation in land development: that is, to meet the demand for land for settlement at a reasonable cost and to stabilize the population in marginal areas. These motives could be satisfied by company operation, although it would necessitate a change of social and political opinion before it would be recognized by a wise politician.

In a sense I am asserting that votes count more than butter and mutton to the politician. This is a contentious argument in political economy and relates to the question as to whether governments should or should not participate in economic transactions when their decisions are made on a political rather than exclusively economic basis.

Another criticism of the land development policy stems from the claim that the funds allocated to the development of problem land could have been more profitably utilized in established districts: that there is an opportunity cost involved. Even in the most productive areas, farms are operated at well below their productive capacity. There is considerable lag in the diffusion of recent innovations, and farmers as entrepreneurs aim for satisfactory rather than optimal returns. It is asserted that capital allocated to fostering the adoption of improved techniques and more intensive use of the resources in established agricultural regions would have produced higher returns than are achieved through allocating similar amounts to the development of problem land. At least fifty per cent of the development cost
in new areas is for housing and road construction. A much lower proportion would be required in an established region.

Comprehensive regional development planning could permit flexible allocation of resources between developing and developed areas. As it is, substitution is virtually impossible because of the different organizational control. Frequently redevelopment assistance under marginal lands assistance is refused solely on the basis of the small size of the enterprise. The individual applicant would be ideally suited for a state developed farm. However, because of institution controls, he is seldom eligible. Another problem is the uncritical allocation of finances by the state treasury to different programs in terms of short run benefits rather than long term regional improvement policy. Obstacles to development of this kind need to be overcome if marginal areas are to be intergrated as self-reliant contributors to the national economy.

Research

Agricultural research is another area where conspicuous success has been achieved through allowing a regional program to evolve. To the pastoralist the sub-tropical environment of Northland presents problems somewhat different from those occurring elsewhere in the dominion. Research into such problems has not only been more fruitful when undertaken within the region, but also has aided in the diffusion of findings.

Nevertheless, most of the research which is relevant to Northland is conducted at research stations outside the region. The results are diffused through extension agencies and demonstration farms. Only the Grassland Division of the Department of Scientific and Industrial Research has a research station in the area, and it is significant to this appraisal of policy alternatives that the re-evaluation of the region’s potential for pastoral farming followed the demonstrated effectiveness of fertilizer trials on tropical grasses at this station and on the state land development blocks. Local research achievements also have other benefits. Farmers are more willing to adopt agricultural innovations demonstrated by successful neighbors than they are from perusal of magazine articles describing success in another region.

The real problem of agricultural research in a marginal area is not in discovering new techniques, but in getting farmers to adopt what is already well known. The provision of small local experimental stations and demonstration farms concerned with regional problems can do much more to diffuse the results of their findings than isolated research institutes. As with the Marginal Assistance loans, the principle of local control of research and assistance would appear to carry special benefits. Where this principle has applied, albeit through chance, such programs have been more successful in meeting the needs of Northland farmers.

Centralized Assistance Programs

Centralized programs operate uniformly throughout the nation. Although they may have been originally designed to assist land development in marginal areas, they tend to be utilized primarily by farmers in the more
prosperous agricultural districts. These programs are generally constrained by regulations and tend to be impermanent.

Many different programs which could legitimately be included under this heading have been introduced at different periods. Most have been political solutions to perceived economic needs. Usually they are of short duration or are modified as the political needs change. Others lapse subsequently, through lack of financial support. A discussion of three programs should suffice to illustrate the nature of centralized assistance and to indicate their inadequacy in solving the problems of marginal agricultural areas. These programs are: 1) state loans, 2) taxation subsidies, and 3) farm income supplements.

The states offers normal and special loan privileges to farmers. Normal loans are granted through the State Advances Corporation and represent state competition with established lending institutions. Whenever the state grants developmental loans that have been refused by existing loan institutions because of their high risk, such are special loans. The State Advances Corporation was originally established to assist agricultural land development, although since 1945 it has become increasingly associated with urban housing loans. This latter aspect now represents their major interest. As a result, the capital available for farm loans is limited; those loans granted are low in risk and unrealistic in constraints. The program enables the government to influence the activities of private lending institutions, although it is of little aid to agricultural development in problem areas. Its principal concern is to grant funds to those who have never owned their own farm, but who have the necessary experience.

Some six million dollars are loaned annually to farmers in Northland by the State Advances Corporation. This is ten times the amount made available under special loan privileges by the Marginal Lands Assistance Board. However, the State Advances capital has little beneficial effect on marginal land where farming is well established. The advantage of the loan is that it makes funds available to those who have heretofore not owned farms at rates of interest which are slightly more favorable than those available from normal lending institutions. Largely because of the inflexible operational procedure it has ceased to serve this purpose. An exception is where funds are used to settle occupiers on state developed farms.

**Taxation Subsidy**

Farm taxation is structured so as to provide special benefits to those who reinvest capital gains in improving farm enterprise. For the financially successful farmer such taxation benefits hold an advantage over comparative benefits available to non-farm investors. However, they are of no use to low income farmers in marginal areas. Their earnings are so low that normal family deductions cover returns from farm operations. Frequently tax subsidies are introduced in budget statements and justified on the basis of the need to aid farm development. They are political solutions to economic problems, and in the New Zealand experience their impermanence obstructs their possible value. The case of the fertilizer subsidy provides an illustration. In order to increase the carrying capacity of grasslands the government, in 1964, introduced a measure that allows farmers to deduct ex-
penditures on fertilizer at the rate of 15 per cent. Farmers took advantage of the incentive and increased the application of fertilizer. The following year the government did not renew the measure but replaced it by a transportation subsidy for farmers in marginal districts. However, most operators in marginal districts lacked the funds to enable them to increase their rate of fertilizer application despite either the tax incentive or the transportation subsidy. Operators in the more productive districts in which fertilizer is manufactured lost the incentive and many reverted to their original rate of fertilizer application designed to maintain pastures rather than increase carrying capacity.

This is but one of the many spasmodic attempts at indirect assistance for agriculture that study reveals. Little understanding of the state’s positive role in the development of uneconomic farming is gained from individual discussion. All that is attained is a sense of the frustration created in attempting to solve economic problems by political means.

**FARM INCOME AND CROP SUPPLEMENTS**

Despite the well established principle of agricultural socialism in New Zealand, the state has been unwilling to award special income benefits for farmers with low incomes in marginal districts, although this would probably have been the most economic alternative. Indirect-production subsidies have had a somewhat more checkered political history, as demonstrated by the transportation subsidy on fertilizers, but they have had little consequence for agricultural development.

Product-inducement subsidies are established only for minor, domestically-oriented crops such as wheat, which is not present in Northland, and milk for urban use. Otherwise prices are established seasonally in anticipation of receipts. Occasionally anticipated export returns are lower, and state funds may be called upon to meet the politically approved basic price. In such instances, the state does play a role in stabilizing prices — i.e., guaranteeing prices — but the price level is not held at an artificially inflated level so as to induce production and bolster farm incomes.

Subsidies which exist are consumer subsidies on butter, milk, eggs, bread and flour. By increasing demand they do influence production. They were introduced during the Second World War so as to offset the rise in the cost of food. For political reasons, they have never been removed. They have had little or no effect upon agricultural development in marginal areas, as there would be little change in consumption patterns if they were removed. Nevertheless they persist and cost the state between thirty-five and forty million dollars annually.

**CONCLUSION**

In this essay, Northland has been portrayed as a marginal agricultural area in which those concerned with the region’s economic development have recently realized the area’s potential. Techniques are now available to handle the special environmental problems which had caused so many failures and much disillusionment in agriculture and which had permeated the entire economy. However, it is one thing to isolate the problems and another to obtain support of farmers to overcome them when many of them
have faced so many years of disillusionment. The potential is there, although many individuals lack the financial and managerial ability to realize the potential.

As an essay by a geographer, little attention has been paid to the impact of specific programs on the farm landscape. Instead, attention is focused upon a process of environmental change. However, it is hoped that the annotated illustrations of extent and nature of the state's direct efforts in land development will provide some appreciation of the impact upon the landscape for those unfamiliar with New Zealand.

The political success of the programs is difficult to gauge. Electoral results indicate no shifts which can be reliably correlated with different programs. Existing programs have been cited when the party holding power has been challenged. In this respect they have assisted in the maintenance of the two major parties, which have faced a greater challenge in Northland than elsewhere in the nation from their only serious competitor, the Social Credit Party.

The substantive conclusion to be derived from this survey is that effective modernization of rural areas achieved primarily through programs controlled within the development region itself. Some form of regional development agency is required, one which has power to allocate state funds to these projects appearing to hold the most promise for improving the regional economy. Such an agency is best governed by local residents conversant with the basic elements of the regional economy and not by central planners. Modern tools of analysis, like cost-benefit analysis and linear programming, should be employed to decide between alternative programs, but implementation ought to be guided by those fully conversant with the social and economic character of those whose cooperation the program requires.

The evaluation of alternatives by such a regional authority should not be restricted to agriculture. The use of the land for forestry or for the employment of farmers in non-farm occupations might offer more realistic alternatives for raising income levels. These alternatives should be considered in the analysis.

Planning for the improvement of rural areas should always be people-oriented rather than program-oriented. Decentralization of decision-making has been achieved with the Marginal Lands Assistance program, and this program more than any other has maintained people as its central focus. When the planning is centralized, programs tend to be designed for all farmers. They utilize the incentive approach to development which is attractive to the already successful farmer, but holds little immediate attraction to the uneconomic farmer in a marginal area. This is not to reason that such incentive programs should not exist, but that a more flexible approach to economic development is desired with programs tailored to the needs of individuals in the various regions.