Virgin Lands

Introduction

When potentially productive virgin lands are brought into use, the relative profitability of farming or ranching on lands with lower inherent productivity can be reduced. Thus, one indirect consequence of developing high-quality virgin lands may be that some fragile lands are protected, perhaps converted from row crops to pasture as happened in New England when the fertile lands of the Midwest were developed. Sometimes opening new high-quality lands also can reduce the rate at which pasture sites are converted to cropland.

Some 36 million acres of non-Federal land had a high potential for conversion to cropland in 1977 (see table B-l), according to the National Agricultural Lands Study (CEQ, 1981). This land had favorable physical characteristics to support high-yield crop production and would require minimal efforts to be converted, Most of this land was used as pasture in 1977; presumably much of it already has been converted to cropland. Another 91 million acres of non-Federal land were identified as having a medium potential for conversion to cropland. Most of this was pasture or rangeland; some was forest, Clearing, erosion protection, or other costs would make development of this land significantly more expensive than on the high-potential land.

The issue of converting land into and out of agriculture, and from one use to another within agriculture, has been investigated by the National Agricultural Lands Study, and so it is not treated in detail in this report. That study did not, however, consider the potential for agriculture development in Alaska, where large areas of potentially arable lands are found.

Table B-l .—Potential Cropland of Non”Federal Land (million acres)

Conversion potential:	High	Medium	Low	Zero
Pastureland	18	33	47	35
Rangeland	9	30	97	271
Forestland	7	24	109	230
Other land	2	4	15	52
Total	36	91	268	588

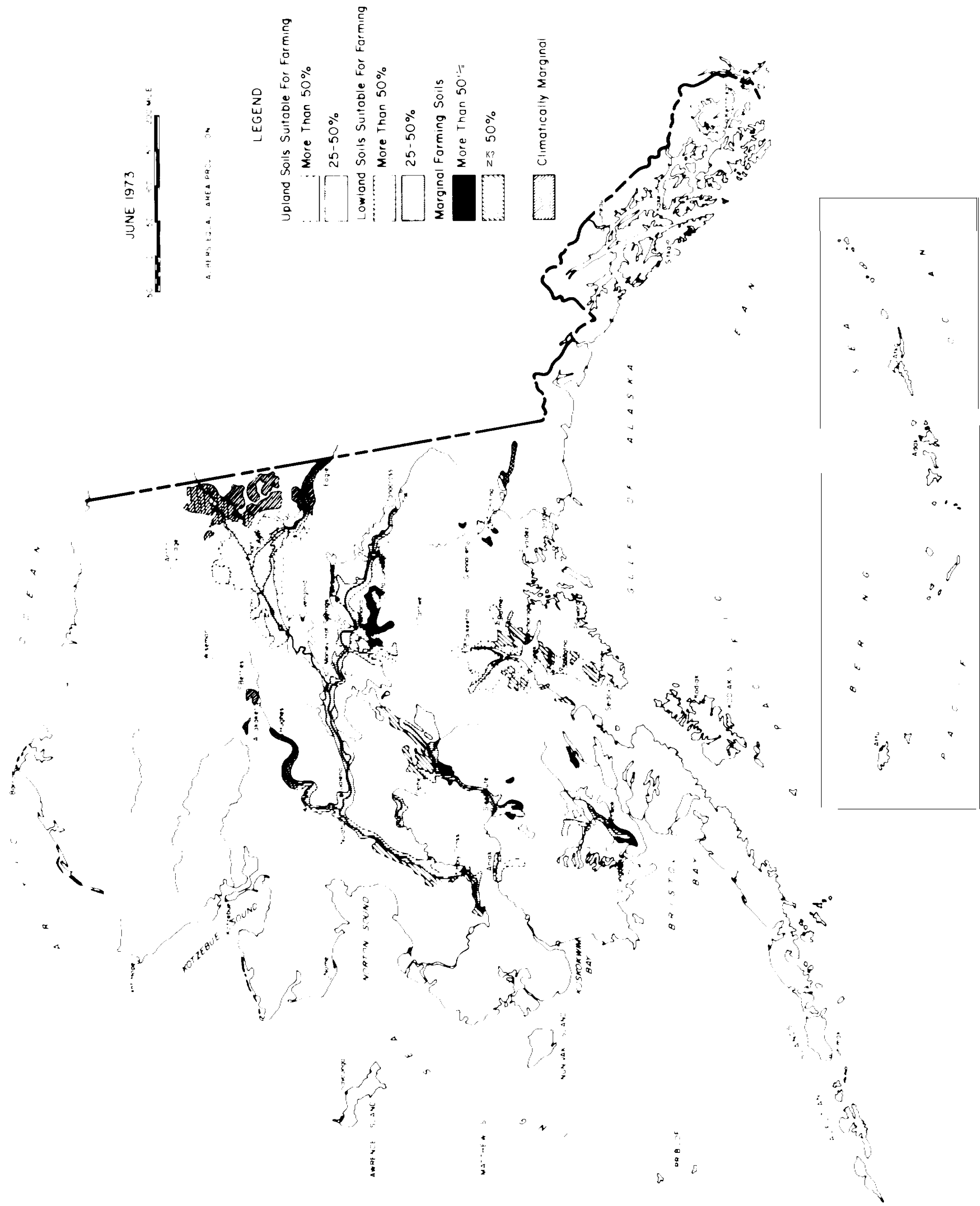
SOURCE U S Department of Agriculture, “Resources Conservation Act Ap. praisal 1980, ” 1980

Alaska% Virgin Lands

How much of Alaska’s virgin lands are potential croplands is not known precisely. The Soil Conservation Service (SCS) cites 18.5 million acres of Alaska land suitable for farming (USDA-SCS, 1980) (see fig. B-l). This is Class 11 and 111 land with soils that have no severe erosion hazard, but that generally do require conservation measures to sustain productivity. But previous analyses of the same data reported that Alaska had 8.9 million potentially arable acres. The substantial increase in the estimate of potentially arable land from 8.9 million to 18.5 million acres was not the result of new data on the extent of land available but rather a changed understanding of what constitutes arable land under Alaskan climate conditions.

There is a mistaken perception that the Alaskan climate precludes substantial agricultural development. Although this is generally true of areas in the arctic climate zone, much of the State is in the continental climate zone, where the frost-free growing season is about 100 to 110 days (Epps, 1980; Alaska Rural Development Council, 1974.) This is a short season relative to most other parts of the United States, but it is adequate for many crops. Soil and air temperatures during the growing season can constrain the growth of some crops, such as corn, but there are other including barley, oats, some wheat cultivars, potatoes, vegetables, and the oilseed canola that produce well in this climate. Some of these, notably barley, oats, canola, and several vegetables, apparently can take advantage of the very long hours of sunlight during the Alaskan summer (up to 20 hours per day). Barley yields, for example, can double those achieved in the Midwest.

Alaska has some active cropland—about 380 farms with 30,000 acres of crops in 1980. (For comparison, cropland in the lower United States totals 413 million acres.) The State government is committed to converting 500,000 more acres to cropIand by 1990. To do this, the State is subsidizing rapid agricultural development with large-scale pilot projects. The largest of these is the Delta Project in the Tanana River drainage, where 22 farmers took ownership of about 2,600 acres each in August 1978. Clearing and development proceeded rapidly and over half of the 58,000-acre project was in


JUNE 1973
LEGEND
Upland Soils Suitable For Farming
More Than 50%
25-50%
Lowland Soils Suitable For Farming
More Than 50%
25-50%
Marginal Farming Soils
Climatically Marginal
KOTZEBUE SOUND
NORTON SOUND
KUSKOKWIM BAY
BRISTOL BAY

production by 1981. The project is to be expanded by 60,000 acres. Other pilot projects include the 15,000-acre Point MacKenzie dairy project with 31 tracts for farms ranging from 300 to 640 acres each. Another project is planned near the town of Nenana, where SCS has identified 175,000 acres of soils with "excellent" potential (Alaska Agricultural Action Council, 1981a and b).

Alaska also has a large livestock potential but currently a small livestock industry. About 1.2 million acres of range were used for livestock grazing in 1978 (Epps, 1980), but the rangeland potential includes some 10 million to 13 million acres of grass-dominated ecosystems where cattle, sheep, and horses could graze and an estimated 100 million acres of lichen- and shrub-dominated ecosystems possibly suited for reindeer grazing. (For comparison, rangelands in the lower United States total 621.4 million acres.) The livestock industry may grow in tandem with grain farming, providing a local market for some barley production and byproducts from grain or oilseed processing,

Alaska imports more than 90 percent of its food supply, including most red meat. But the economic constraints on developing in-State agriculture are formidable. With current markets, imported food generally is less expensive than Alaskan-grown food. This is caused principally by the lack of marketing and distribution structures to accommodate local production (Epps, 1980). Such structures have not developed because existing farms cannot support processing, distribution, and marketing investments. Thus, there is a development bottleneck that the State government is trying to remedy with various subsidies. (It should be noted that development of agriculture in other parts of the United States has also been subsidized by Government.)

Most of Alaska's potential cropland is located in the interior along the drainages of the Yukon, Tanana, Copper, Matanuska, and Susitna rivers. Developing this agricultural potential will mean that some of that land's present production of timber and wildlife will be foregone. The value of this production cannot be quantified accurately to compare it with the projected value of agricultural crops. Because the land is still in Government ownership, and because substantial development is unlikely without Government subsidies, the tradeoffs will be weighed in the process of State politics in Alaska. In any case, development will be a deliberate and gradual process that could profit from the study of development mistakes made in other States and from advances in the understanding of agricultural ecology.

Alaska probably has more control over farmers' implementation of conservation practices and choice of production methods than any other State because the State government still has title to most land that will become farmland (see table B-2). This power is being used to protect the sustainability of the resource base. The State requires that individual farm conservation plans be prepared with the local soil conservation subdistricts and approved by the State Department of Natural Resources. The plan is recorded as a covenant against the title, so it must be carried out.

In the main pilot project near the Delta-Clearwater area, for example, the soils have a silt-loam texture and are shallow and subject to seasonal drying (Knight, et al., 1979). SCS officials rate these soils with a relatively low tolerance for soil loss. Original surveys in the area indicated that the soils were moderately erodible, but data collected in 1978, the year when lands were allocated to farmers, indicated higher credibility than originally estimated. These problems were foreseen, however. A number of institutions, including the State's Agricultural Experiment Station, SCS, and the Alaska Department of Natural Resources, have been cooperating in research on environmental variables and soil management alternatives under Alaskan conditions. Thus, a number of appropriate technologies including conservation tillage, stripcropping, shelterbelt, and other practices are included in the new farms' conservation plans.

The Delta-Clearwater soils are typical of the potentially arable lands of interior Alaska in that they are mainly wind- or water-deposited soil materials that are susceptible to erosion. Because much of the terrain is level or gently sloping, water erosion hazards are generally minimal. Wind erosion, however, can be a problem.

Table B-2.—Landownership in Alaska as of September 1981 (millions of acres)

Landowner	Distribution of landownership when Federal transfers are complete[a]	Current distribution of landownership
U.S. Government. . . .	225.5	302.4
Alaska State government . .	104.5	53.0[b]
Indian corporation . . ., . . .	44.0	18.6[c]
Private	1,0	1.0
Total	375.0	375.0

a Tabel does not include tranfers from State to private lands

[b] Alaska State government selection period ends January 1994,

c The balance of Indian Corp lands has been selected but title transfer has not yet been approved

SOURCE Beaumont McClure, Bureau of Land Management, Alaska Programs Staff, September 1981

With range ecosystems, as with croplands, the environmental parameters that determine which Alaskan land is suitable for grazing are still being determined. The 1979 RPA report notes that Alaskan ecosystems generally have low productivity levels. Only the shrub thickets and the Aleutian moist tundra with the tall blue joint reedgrass produce over a ton of herbage and browse per acre on their best sites, The report indicates that there are about 19 million acres in these two types of rangelands but does not say what part comprises the best sites (USDA, 1979). (One ton of herbage per acre is a fairly setcre test–only about one-eighth of the rangelands in the contiguous States are expected to produce at this level, even when in top condition.)

The grass-dominated, rangeland ecosystems located in the south-central coastal region and on the eastern Aleutian Islands did not evolve under intensive grazing by native herbivores. Thus, the existing plant communities may change substantially if grazed by domestic livestock. Secondary environment al effects will need to be monitored carefully as the livestock industry expands. Another consideration is the rate of nutrient cycling under Alaskan rangeland conditions. Research on native hay yields indicates that once-per-year harvests without fertilization tend to cut production in half', and persistent use by livestock could have more severe effects (Mitchell, 1974). Fertilizer can sustain production, but fertilizing rangelands is rarely economically feasible.

Tundra rangelands are much more extensive than grasslands, and reindeer, which graze the lichen- and shrub-dominated tundra and are physiologically adapted to survive the long winters with little supplemental feeding, could be used to expand the livestock industry in Alaska. Reindeer were introduced to Alaska in 1891. The herds increased to over 600,000 head by 1932, but declined in the next two decades to about 25,000 and have increased only slightly since. Overstocking and consequent range failure are cited as partial reasons for the decline of reindeer ranching (USDA, 1980).

Lichens and shrubs take decades to recover from overgrazing but are now in good condition again. Recently there has been renewed interest in reindeer, and range management plans now are being deesigned to avoid overgrazing, Forage on summer range is plentiful and the main range management problem is to provide sufficient winter range to allow for long rest periods in a rest-rotation grazing system. (After a lichen has been disturbed by reindqeer, it takes 2 years for remaining fragments to start new plants, Thus, winter sites are rested for 4 to 8 years in the new grazing systems (U. Alaska, 1980)). SCS and the University of Alaska initiated resource surveys on tundra rangelands in 1976 using imagery from Landsat, the National Aeronautics and Space Administration's Earth resources satellite, and extensive field surveys. Conservation range plans are now nearly complete for 15 million acres of the Seward Peninsula.

Some native animals that are well adapted to tundra and other Alaskan habitats probably are suitable for domestication to produce food and fiber. For example, small-scale husbandry of musk oxen, which produce high-quality wool, has demonstrated some potential. However, intensified management of caribou or other animals now' considered to be "game" would require a philosophic; al attitude change on the part of the public and resource management professionals (U SDA-RPA, 1979),

The impact of cropland development and increasing herds of exotic livestock on the nativee wildlife resources of Alaska is likely to remain an issue as the State develops its resource potentials. For example, a large part of the State's potentially tillable land is located in the Upper Yukon Basin, an area with extraordinarily productitve waterfowl habitat. The waterfowl reproduce in poorly drained flood plains which abound with oxbow and pothole lakes. Above these flood plains, however, there are some 3 million acres of well-drained tillable soils (Drew 1979). Whether to plan eventual developrnent of the Upper Yukon Basin's tillable soils has been a point of contention and the topic of congressional hearings (U.S. Congress, 1979). Agriculturalists recognize that draining and clearing the pothole areas of Yukon Flats would be an error, but believe the option of developing some of the well-drained lands should be kept open. They note that some wildlife and agriculture can coexist and predict that producing small grains could enhance waterfowl habitat. Other experts are less optimistic about the coexistence of agriculture and wildlife. They are concerned, for example, that agricultural development in the Upper Yukon region would eventually bring pressures to regulate the flow of the river, which in turn would harm warterfowl reproduction

Other conflicts may arise as agriculture develops. Irrigation is likely for some arable areas, and ground water use could become controversial in permafrost regions. Irrigation and agricultural runoff also could affect salmon spawning areas.

Conclusions

Many important questions remain to be answered about both farming and livestock enterprises in Alaska. The State is in the unique position of being able to learn from the decades of agricultural experience in the lower 48 States. But direct transfer of agricultural technologies from lower latitude research and development is not sufficient because crop production and range management in Alaska involve significantly different soil temperatures, climate, and growing seasons. The ecology of agriculture—dynamics of nutrient cycles, soil formation, and plant physiology, for example—need to be better known in order to design farm and range management programs that will sustain the initially high productivity of Alaska's virgin agricultural resources.

A major threat to the long-term maintenance of Alaska's inherent land productivity is the prospect of making decisions with inadequate data. For example, the majority of Alaska's potential agricultural soils are intermingled with or adjacent to forestlands and yet only very limited assessments have been made of the interrelationships between forest management and agricultural land management, Inadequate climate data is another example, Under cool weather growing conditions, the timing of chemical inputs and other farming practices is critically important. But knowledge of microclimates and data bases for weather forecasting are inadequate to support optimum decisions. The soils data used to identify the *18.5* million acres of potentially tillable soils is a preliminary survey, adequate for broad planning but not for project- or farm-level decisions. Similarly, not enough is known about the ground water hydrology of the potential agriculture lands to foresee the conflicts that may arise.

Thus, Alaska must maintain a strong research program if it is to develop its agricultural potential and help to reduce the economic pressure to consume land resources elsewhere. The role of the Federal Government will be to support the necessary research for site-specific management decisions and to provide sufficient expert personnel in such agencies as SCS to continue the conservation planning momentum that has characterized the accelerating agricultural development of the past 3 years.

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