

ALASKA LEGISLATURE SPECIAL COMMITTEE / SUBJECT FILES 86/2

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and carried into effect from time to time which may be necessary to prevent the loss of, or damage to, the property donated, or an abuse or neglect of the trust so as to defeat, materially change, or prevent the objects of the donation.

(h) Copies of the donation shall be filed with the board or the branch to which the donation applies; and the board shall report the condition and management of the property and the manner in which the trust is being administered as part of the matters reported pertaining to the institution.

[Acts 1971, 62nd Leg., p. 3146, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971; Acts 1973, 63rd Leg., p. 1577, ch. 568, § 1, eff. Aug. 27, 1973.]

§ 65.37. Funds Received for Trust Services

The board may deposit in an appropriate university account all funds received as administrative fees or charges for services rendered in the management and administration of any trust estate under the control of the university system or any institution of the system. The funds so received as administrative fees or charges may be expended by the board for any educational purpose of the university system. [Acts 1971, 62nd Leg., p. 3147, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 65.38. Nonsectarian

No religious qualification shall be required for admission to any office or privilege in the university system. No course of instruction of a sectarian character shall be taught in the system. [Acts 1971, 62nd Leg., p. 3147, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 65.39. Management of Lands other than Permanent University Fund Lands

The board of regents of The University of Texas System has the sole and exclusive management and control of the lands set aside and appropriated to, or acquired by, The University of Texas System. The board may sell, lease, and otherwise manage, control, and use the lands in any manner and at prices and under terms and conditions the board deems best for the interest of The University of Texas System, not in conflict with the constitution. However, the land shall not be sold at a price less per acre than that at which the same class of other public land may be sold under the statutes. No grazing lease shall be made for a period of more than 10 years. [Acts 1971, 62nd Leg., p. 3147, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 65.40. Environmental Science Park

(a) The board is hereby authorized to establish, maintain, and support an environmental science park in Bastrop County, Texas, on lands owned or controlled by it, the administration and business management of which shall be delegated to The University of Texas M. D. Anderson Hospital and Tumor Institute at Houston.¹

(b) The board shall have authority to cooperate with agencies, institutions, instrumentalities, and subdivisions of this state, other states, and the federal government; and with private institutes, institutions, foundations, and organizations, in the furtherance of this section, and the promotion of educational and environmental science programs.

(c) The board is specifically authorized upon terms and conditions acceptable to it, to accept and administer, gifts, grants, or donations, of any kind, from any source, to aid in the establishment, operation, maintenance, or administration of the environmental science park.

[Acts 1971, 62nd Leg., p. 3336, ch. 1024, art. 2, § 2, eff. Sept. 1, 1971.]

¹ See § 72.101 et seq.

CHAPTER 66. PERMANENT UNIVERSITY FUND

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SUBCHAPTER A. COMPOSITION, INVESTMENT, AND USE

§ 66.01. Permanent University Fund

The composition, investment, purposes, and use of the permanent university fund are governed by Article VII, Sections 10, 11, 11a, 15, and 18, of the Texas Constitution.

[Acts 1971, 62nd Leg., p. 3149, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.02. Available University Fund

The dividends, interest, and other income from the permanent university fund shall constitute the available

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able university fund. All income derived from the permanent university fund shall be deposited in the State Treasury to the credit of the available university fund within five days after receipt by any state officer, agent, or employee.

[Acts 1971, 62nd Leg., p. 3149, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.03. Apportionment and Use of Available Fund

(a) The reference in Article VII, Section 18 of the Texas Constitution, to "Chapter 42 of the Acts of the Regular Session of the 42nd Legislature of the State of Texas" shall be construed to mean this section.

(b) The board of regents of The University of Texas System shall expend as much of the available university fund as is appropriated by the legislature for the administration of the university lands and of the permanent university fund, the expenses to be apportioned between the two systems in proportion to their receipts of available university funds under the terms of this section.

(c) The board of directors of The Texas A&M University System shall expend one-third of all the available university fund received from the permanent university fund arising from the 1,000,000 acres of land appropriated by the constitution and the land appropriated by the Act of 1883, except income from grazing leases on university lands (less its proportion of expenses of administration and excluding any expenses of administration from grazing leases); and the board of regents of The University of Texas System shall expend the balance of the available fund, including all the income from grazing leases on university lands (less its proportion of expenses of administration).

[Acts 1971, 62nd Leg., p. 3149, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.04. Validity of Bonds Purchased by Board

Whenever the board has purchased the bonds of any city, county, or municipality, approved by the attorney general, the certificate of the attorney general attesting their validity shall be admitted and received as prima facie evidence of the validity of the bonds; and in all cases in which the proceeds of the sale of these bonds have been received by the proper officers of the city, municipality, or county, or by the party acting for them in negotiating the sale of the bonds, the city, municipality, or county is thereafter estopped from denying the validity of the bonds and they shall be held to be valid and binding obligations. In the case of any bonds bought under this section, premium or discount shall be distributed over the life of the bonds.

[Acts 1971, 62nd Leg., p. 3149, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.05. Reports

(a) Before December 1 of each year the board of regents of The University of Texas System shall prepare a written report disclosing all details concerning the investments made and income realized from the permanent university fund during the year ending August 31 preceding the publication of the report.

(b) The report shall contain a summary of all investments and an itemized list of all securities held

for the fund on August 31, a summary of investment changes during the preceding year, and a summary of all income realized from the various components of the fund. The report shall also contain any other information needed to clearly indicate the nature and extent of investments made of the fund and all income realized from the components of the fund.

(c) The report shall be distributed to the governor, state treasurer, state comptroller of public accounts, state auditor, attorney general, commissioner of higher education, and to the members of the legislature by the 1st day of January each year. The board shall furnish copies of the report to any interested person on request.

[Acts 1971, 62nd Leg., p. 3347, ch. 1024, art. 2, § 20, eff. Sept. 1, 1971.]

[Sections 66.06 to 66.20 reserved for expansion]

SUBCHAPTER B. PERMANENT UNIVERSITY FUND BONDS AND NOTES

§ 66.21. Registration

All bonds and notes issued pursuant to the provisions of Article VII, Section 18, of the Texas Constitution, as originally adopted or as amended, shall be registered by the comptroller of public accounts after they have been approved by the attorney general.

[Acts 1971, 62nd Leg., p. 3150, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.22. Refunding Bonds and Notes

Any bonds or notes issued pursuant to the constitutional provisions described in Section 66.21 of this code, or issued pursuant to this subchapter, may be refunded by the governing board which issued the bonds or notes, upon such terms and conditions, including interest rates and maturities, as may be determined by that board, provided that such terms and conditions shall not be inconsistent with the applicable constitutional provisions. Any such bonds or notes may be so refunded by the issuance of refunding bonds or notes, either to be exchanged for the bonds or notes being refunded and cancelled, or to be sold, with the proceeds to be used for the redemption and cancellation of the bonds or notes being refunded.

[Acts 1971, 62nd Leg., p. 3150, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.23. Refunding Bonds and Notes: Approval; Registration

All refunding bonds or notes authorized to be issued under this subchapter and the records relating to their issuance, including any proceedings relating to the redemption of any outstanding bonds or notes, shall be submitted to the attorney general for examination, and if he finds that they have been issued in accordance with law, he shall approve them, and then they shall be registered by the comptroller of public accounts, and after such approval and registration they shall be incontestable. When any such refunding bonds or notes are issued to be exchanged for any outstanding bonds or notes, the comptroller of public accounts shall register and deliver such refunding bonds on surrender for cancellation of the bonds or notes being refunded. When any such refunding bonds or notes are sold, with the proceeds to be used for redeeming any outstanding bonds or notes, the comptroller of public accounts shall regis-

ter such refunding bonds or notes, even though the bonds or notes to be redeemed shall not have been surrendered for redemption or cancellation.
[Acts 1971, 62nd Leg., p. 3150, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.24. Authorized Investments; Security for Deposits

All bonds and notes, whether original or refunding, issued pursuant to the constitutional provisions or issued pursuant to this subchapter, shall be fully negotiable instruments, and all bonds and notes are declared to be legal and authorized investments for banks, savings banks, trust companies, building and loan associations, savings and loan associations, insurance companies, fiduciaries, trustees, guardians, and for the sinking funds of cities, towns, villages, counties, school districts, and all other political corporations or subdivisions of the State of Texas; and the bonds and notes shall be eligible to secure the deposit of any and all public funds of the State of Texas, and any and all public funds of cities, towns, villages, counties, school districts, and all other political corporations or subdivisions of the State of Texas; and the bonds and notes shall be lawful and sufficient security for those deposits to the extent of their par value when accompanied by all unmatured coupons appurtenant to them.

[Acts 1971, 62nd Leg., p. 3150, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.25. Tax Exempt

The carrying out of the purposes of the constitutional provisions and of this subchapter will be performing an essential public function under the constitution, and all bonds and notes, whether original or refunding, heretofore or hereafter issued pursuant to the constitutional provisions or this subchapter, and their transfer and the income from them, including the profits made on their sale, shall at all times be free from taxation of this state.

[Acts 1971, 62nd Leg., p. 3151, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

[Sections 66.26 to 66.40 reserved for expansion.]

SUBCHAPTER C. MANAGEMENT OF UNIVERSITY LANDS

§ 66.41. Management of University Lands

The board of regents of The University of Texas System has the sole and exclusive management and control of the lands set aside and appropriated to, or acquired by, the permanent university fund. The board may sell, lease, and otherwise manage, control, and use the lands in any manner and at prices and under terms and conditions the board deems best for the interest of the permanent university fund, not in conflict with the constitution. However, the land shall not be sold at a price less per acre than that at which the same class of other public land may be sold under the statutes. No grazing lease shall be made for a period of more than 10 years.

[Acts 1971, 62nd Leg., p. 3151, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.42. Duty of Land Commissioner

The commissioner of the general land office shall:

- (1) furnish to the board of regents complete and accurate maps and all other data necessary

to show the location and condition of every tract of the university lands;

- (2) furnish to the board any additional information it may require; and

- (3) render to the board any possible assistance it may request in the discharge of its duties under this chapter.

[Acts 1971, 62nd Leg., p. 3151, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.43. University Lands; Surveys; Personnel

(a) The board of regents shall cause to be done such surveying or resurveying of the blocks and subdivisions of the university lands as may be necessary to enable the lines of the blocks and sections and fractional sections to be determined and identified and have such corners as may be necessary to that end permanently marked. When it is impracticable to establish such lines and corners as originally surveyed, or when such sections have not been actually surveyed on the ground, the blocks shall be surveyed or resurveyed and divided into surveys of sections and fractional sections, and as many corners thereof as may be necessary for the identification shall be permanently marked. The surveyors to do such surveying shall be employed by the board. The field notes of such surveys shall be returned to the general land office, and when correct and in accordance with law shall be approved by the commissioner of the general land office, filed in the general land office, and become archives therein.

(b) The board of regents may employ and compensate personnel the board deems necessary in connection with performance of any duties under this section or under Subchapter D of this chapter.

[Acts 1971, 62nd Leg., p. 3151, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

¹ Section 66.61 et seq.

§ 66.44. Management of Minerals Other than Oil and Gas

The board of regents has the sole and exclusive management and control of all minerals, other than oil and gas, in lands set aside and appropriated to, or acquired by, the permanent university fund. The board may sell, lease, and otherwise manage and control the minerals, other than oil and gas, in these lands as may seem best to it for the interests of the permanent university fund. The board may explore and have explored and developed the minerals and may make any contract or contracts with any person, association of persons, firm, or corporation for the exploration, development, mining, production, disposition, and sale of the minerals in these lands.

[Acts 1971, 62nd Leg., p. 3152, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

[Sections 66.45 to 66.60 reserved for expansion.]

SUBCHAPTER D. BOARD FOR LEASE OF UNIVERSITY LANDS

§ 66.61. Definition

As used in this subchapter, "board" means the Board for Lease of University Lands.

[Acts 1971, 62nd Leg., p. 3152, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.62. Board for Lease

(a) The Board for Lease of University Lands is composed of the commissioner of the general land office and two members of the board of regents selected by the board of regents. In the event that a regent member of the Board for Lease of University Lands is unable to attend any meeting of that board, the chairman of the board of regents shall appoint another member of the board of regents as a substitute member of the Board for Lease of University Lands to attend the meeting that the regular regent member is unable to attend. The substitute regent member of the Board for Lease of University Lands shall exercise all the powers, duties, and responsibilities of the absent regent member during the conduct of the meeting for which he was appointed. Any substitute regent member of the Board for Lease of University Lands is subject to the provisions of this subchapter.

(b) Neither regent member may be directly or indirectly employed by, or be an officer of or an attorney for, an oil or gas company.

(c) A majority of the board has the power to act for the board.

(d) The board shall perform the duties prescribed by this subchapter and shall keep a public record of all its proceedings.

[Acts 1971, 62nd Leg., p. 3152, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971; Acts 1973, 63rd Leg., p. 1578, ch. 569, § 1, eff. June 15, 1973.]

§ 66.63. Oil and Gas Subject to Sale

The oil and gas in the university lands are subject to sale under the regulations, at the times, and on the terms provided in this subchapter, and under the rules and regulations adopted by the board as authorized by this subchapter, not inconsistent with the provisions of this subchapter.

[Acts 1971, 62nd Leg., p. 3152, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.64. Placing Oil and Gas on Market; Public Auction; Advertisement

(a) Whenever there is a demand for the purchase of oil and gas in any university land that will reasonably insure that the oil and gas may be sold advantageously, the board shall place the oil and gas in the land on the market in separate tracts of such area and extent as the board may determine most suitable for profitable marketing; but in no event shall any tract in which oil and gas is offered for as a unit exceed in area of 6,000 acres.

(b) The sale of the oil and gas shall be made at public auction held in Austin at any hour between 10 a. m. and 5 p. m.

(c) The board shall cause an advertisement to be made of the sale in two or more newspapers of general circulation in this state. The advertisement shall state the method, time, and place of sale; the primary term of the lease proposed to be executed covering any sale; the royalty to be paid; that lists describing the land to be sold may be obtained from the board; and other matters that in the judgment of the board are deemed advisable. In addition to the foregoing mandatory provisions, the board may

cause the advertisement to be placed in oil and gas journals in and out of the state and to be mailed generally to persons it thinks might be interested.

[Acts 1971, 62nd Leg., p. 3152, p. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.65. Royalty; Bonus; Annual Rental; Special Fee

(a) The oil and gas in each tract shall be offered for sale for a bonus in addition to the stipulated royalty. Each tract shall be offered separately.

(b) Each bid is subject to the royalty specified in the official advertisement preceding the sale, but in no event less than one-eighth of the gross production of oil and gas in the land; and shall further be subject to the payment of an annual rental after the first year of not less than 10 cents per acre, payable each year in advance, unless the royalties received from the land during the preceding year equal or exceed the amount of the annual rental payment.

(c) Each bid is also subject to the payment of a special fee equal to one percent of the total sum bid, which special payment shall constitute a special fund from which the board for lease shall defray the expenses of the sale, including the payment for the services of the auctioneer crying the sale and the payment of the general operating expenses in geologizing, oil field supervision, and auditing oil and gas production of university lands, including salaries and traveling expenses of persons employed by the board of regents for those purposes, and for the purpose of acquiring, constructing, and equipping a building in the city of Midland or adjacent area to house the administrative staff of the offices of University Lands, Geology and Land Agent, and such other related agencies necessary for the management and development of university lands in West Texas.

(d) The board for lease may also direct the controller of The University of Texas System to transmit to the state treasurer for deposit to the credit of the permanent university fund any unexpended balances remaining in the special fund after reserving a sufficient amount in it for the payment of current expenses as set out in Subsection (c) of this section.

(e) The highest successful bidder shall pay to the commissioner of the general land office on the day the bid is accepted the full amount of bonus bid and the special fee.

[Acts 1971, 62nd Leg., p. 3153, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.66. Withdrawal of Lands Before Bids Received

The board may withdraw any lands advertised for lease before the hour set for receiving bids.

[Acts 1971, 62nd Leg., p. 3154, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.67. Award of Lease

(a) If any one of the bidders at the sale at public auction has offered a reasonable and proper price for any tract offered, not less than the price fixed by the board, the land advertised may be leased for oil and gas purposes under the terms of this subchapter and any regulations the board may prescribe, not inconsistent with the provisions of this subchapter. All bids may be rejected by the board.

(b) If the board determines that a satisfactory bid has been offered for the oil and gas, it shall make an award to the bidder offering the highest price, and a lease shall be executed by the commissioner of the general land office. A duplicate copy of the lease shall be filed in the general land office.

[Acts 1971, 62nd Leg., p. 3154, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.68. Provisions of Lease

(a) Each lease executed under this subchapter shall contain, and each valid and subsisting oil and gas lease previously executed by the commissioner under the source statute for this subchapter, on the application of the lessee and payment of a sum of money equal to one year's annual rental under the lease, shall be amended by written instrument to contain, the provisions prescribed by this section.

(b) Each lease shall provide that the primary term of the lease, as determined by the board prior to the promulgation of the advertisement, shall in no case exceed five years.

(c) Each lease shall provide that if oil and/or gas is being produced in paying quantities from the leased premises before the termination of the primary term, such lease shall not terminate but shall continue in force and effect as long as oil and/or gas is being so produced.

(d) Each lease shall provide that in the event production of oil or gas on the leased premises, after once obtained, shall cease for any cause within 60 days before the expiration of the primary term of such lease or at any time or times thereafter, such lease shall not terminate, if the lessee commences additional drilling or reworking operations within 60 days thereafter, and such lease shall remain in full force and effect so long as such operations continue in good faith and in workmanlike manner, without interruptions, totaling more than 60 days during any one such operation; and if such drilling or reworking operations result in the production of oil and/or gas, such lease shall remain in full force and effect so long as oil or gas is produced therefrom in paying quantities or payment of shut-in gas well royalty or compensatory royalties is made as hereinafter provided in this subchapter.

(e) Each lease shall provide that if at the expiration of the primary term or at any time thereafter there is located on the leased premises a well or wells capable of producing gas in paying quantities and such gas is not produced for lack of a suitable market and such lease is not being otherwise maintained in force and effect, the lessee may pay as royalty \$1,200 per annum for each well on the lease capable of producing gas in paying quantities, such payment to be made to the commissioner of the general land office at Austin, Texas, prior to the expiration of the primary term of the lease, or if the primary term has expired, within 60 days after lessee ceases to produce gas from such well or wells, and if such payment is made, the lease shall be considered to be a producing lease and such shut-in gas well royalty payment shall extend the term of the lease for a period of one year from the end of the primary term or from the first day of the month next succeeding the month in which production ceased; and thereafter if no suitable market for such gas exists, the lessee may extend the lease for two additional and successive periods of one year

each by the payment of a like sum of money each year on or before the expiration of the extended term. Provided, however, that if, while such lease is being maintained in force and effect by payment of such shut-in gas well royalty, gas should be sold and delivered in paying quantities from a well situated within 1,000 feet of the leased premises and completed in the same producing reservoir or in any case where drainage is occurring, the right to further extend the lease by such shut-in gas well royalty payments shall cease, but such lease shall remain in force and effect for the remainder of the current one year period for which the shut-in gas well royalty has been paid, and for an additional period not to exceed a combined total of three years from the expiration of the primary term or from the first day of the month next succeeding the month in which production ceased by the payment by the lessee of compensatory royalty, at the royalty rate provided for in such university lease as would be due on an equivalent amount of like quality gas produced and delivered from the well completed in the same producing reservoir from which gas is being sold and delivered and which is situated within 1,000 feet of, or draining, the leased premises on which shut-in gas well is situated, such compensatory royalty to be paid monthly to the Commissioner of the General Land Office at Austin, Texas, beginning on or before the last day of the month next succeeding the month in which such gas is sold and delivered from the well situated within 1,000 feet of, or draining, the leased premises and completed in the same producing reservoir; provided further, that in the event such compensatory royalties paid in any 12-month period are in a sum less than the annual shut-in gas well royalties provided for in this section, the lessee shall pay an additional sum equal to the difference within 30 days from the end of such 12-month period; provided further, that nothing herein shall relieve the lessee of the obligation of reasonable development, nor of the obligation to drill offset wells required by Section 66.75 of this code.

(f) Each lease shall provide that if, at the expiration of the primary term, production of oil and/or gas has not been obtained in paying quantities on the leased premises but drilling operations are being conducted thereon in good faith and in good and workmanlike manner, the lessee may, on or before the expiration of the primary term, file in the general land office written application to the commissioner for a 30-day extension of such lease, such application to be accompanied by a payment of \$7.50 per acre for each acre in the lease, and the commissioner shall, in writing, extend such lease for a 30-day period from and after the expiration of the primary term and so long thereafter as oil or gas is produced in paying quantities from the premises; provided further, that the lessee may, so long as such drilling operations are being conducted in good faith, make like application and payment during any 30-day extended period for an additional extension of 30 days not to exceed a combined total of 180 days; provided, however, lessee may, so long as such drilling operations are being conducted in good faith, make written application to the commissioner, on or before the expiration of the initial extended period, i.e., 180 days for an additional extension of 180 days, such application to be accompanied by a payment of \$50 per acre for each acre in the lease, and the commissioner shall, in writing, extend such lease for an

additional 180-day period from and after the expiration of the initial extended period of 180 days, and so long thereafter as oil or gas is produced in paying quantities from the premises; provided, that no lease shall be extended under the provisions of this section for more than a total of 360 days from and after the expiration of the primary term unless production in paying quantities has been obtained.

(g) Each lease shall contain a provision enabling the board, at its election, to require that payment of royalty as stipulated in the lease be in kind. Such option may be exercised from time to time at the discretion of the board upon not less than six months' notice to the lessee. The board shall have all powers necessary to negotiate and execute sales contracts or any other instruments necessary for the disposition of any royalty taken in kind. Such other reasonable provisions, not inconsistent with this subchapter, as will facilitate the efficient and equitable payment of royalty in kind may be included in this lease by the board.

[Acts 1971, 62nd Leg., p. 3154, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971; Acts 1973, 63rd Leg., p. 621, ch. 265, § 1, eff. June 11, 1973.]

§ 66.69. Lease: Additional Provisions

Each oil and gas lease issued on university lands under this subchapter shall include any additional provisions and regulations, not inconsistent with the provisions of this subchapter, that the board may prescribe to preserve the interest of the state and safeguard the university funds.

[Acts 1971, 62nd Leg., p. 3155, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.70. Compensatory Royalties in Lieu of Offset Wells

(a) Subject to the provisions of this section, the commissioner of the general land office may execute agreements on behalf of the permanent university fund that provide for the payment by university land oil and gas lessees of compensatory royalty in lieu of drilling offset wells that may be required to protect a university oil and gas lease from drainage from a well or wells located on non-university lands or university lands leased at a lesser royalty situated within 1,000 feet of or draining the university-leased premises.

(b) Agreements providing for the payment of compensatory royalty must be approved by the board for lease of university lands.

(c) Any such agreement must be found by the commissioner and the board for lease to be in the best interest of the state and necessary to prevent economic waste.

(d) Nothing in an agreement shall relieve the lessee of the obligation of reasonable development or of the obligation to drill offset wells as required by Section 66.75 of this code as to other producing horizons.

(e) Beginning on the date fixed in the agreement, the lessee shall pay the compensatory royalty monthly to the commissioner at the land office in Austin.

(f) The agreement with respect to the interest of the state shall remain in force and effect as long as oil and gas, or either of them, is produced from a well located on university or non-university acreage and draining the university-leased premises.

(g) The agreement may contain other provisions the commissioner and the board for lease deem necessary to protect the interests of the permanent university fund.

[Acts 1971, 62nd Leg., p. 3154, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.71. Prorated or Reduced Production Contracts

Whenever in the discretion of the board it is to the best interest of the university and its permanent fund that production from any lease for a limited period of time should be prorated or reduced, the board may execute the necessary contract or contracts with the lessee or lessees and their assignees to effectuate the same and to carry out the intention of this subchapter.

[Acts 1971, 62nd Leg., p. 3156, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.72. Extension of Producing Lease

If oil or gas is discovered in paying quantities on any tract covered by a lease, then the lease as to that tract shall remain in force as long as oil and gas is produced in paying quantities from the tract, provided that the other provisions of this subchapter are complied with by the lessee.

[Acts 1971, 62nd Leg., p. 3157, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.73. Assignment; Relinquishment

(a) All rights purchased may be assigned in quantities of not less than 40 acres, unless there are less than 40 acres remaining out of the tract originally leased under this subchapter, in which case the lesser area may be assigned. All assignments shall be filed in the general land office within 100 days after the date of the first acknowledgment thereof, accompanied by 10 cents an acre for each acre assigned; and if not so filed and payment made, the assignment shall be ineffective.

(b) All rights to any entire lease and to any assigned portion thereof may be relinquished to the state at any time by having an instrument of relinquishment recorded in the county or counties in which the area may be situated and filed in the land office accompanied by \$1 for each area assigned; but such assignment shall not release the owners of any past due obligations theretofore accrued thereon.

[Acts 1971, 62nd Leg., p. 3157, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.74. Royalty Payments; Inspection of Records

(a) Royalty as stipulated in the sale shall be paid to the general land office at Austin for the benefit of the university permanent fund on or before the last day of each month for the preceding month during the life of the rights purchased; and it shall be accompanied by the sworn statement of the owner, manager, or other authorized agent showing the gross amount of oil produced and saved since the last report, the amount of gas produced and sold off the premises, and the market value of the oil and gas, together with a copy of gas meter readings, pipeline receipts, gas line receipts, and other checks and memoranda of the amounts produced and put into pipelines, tanks, or pools and gas lines or gas storage.

(b) The books and accounts, receipt and discharges of all wells, tanks, pools, meters, pipelines, and all contracts and other records pertaining to the production, transportation, sale, and marketing of the oil and gas shall at all times be subject to inspection and examination by the commissioner of the general land office, the attorney general, the governor, or any member of the board of regents, or the representative of either.

[Acts 1971, 62nd Leg., p. 3157, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.75. Protection from Drainage

In every case where the area in which the oil and gas sold shall be contiguous or adjacent to land not university land, the acceptance of the bid and the sale made thereby shall constitute an obligation on the lessee to adequately protect the land leased from drainage from adjacent lands. In cases where the area in which the oil and gas is sold is contiguous to other university lands leased or sold, at a lesser royalty, the lessee shall likewise protect the state from drainage from the land so leased or sold for a lesser royalty. On failure to protect the land from drainage, the sale and all rights thereunder may be forfeited by the board in the manner provided in this subchapter for forfeitures.

[Acts 1971, 62nd Leg., p. 3157, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.76. Forfeiture; Other Remedies; Lien

(a) If the owner of the rights acquired under this subchapter fails or refuses to make the payment of any sum due thereon, either as rental or royalty on the production, within 30 days after same becomes due, or if the owner or his authorized agent makes any false return or false report concerning production, royalty, or drilling, or if the owner fails or refuses to drill any offset well or wells in good faith, as required by his lease, or if the owner or his agent refuses the proper authority access to the records and other data pertaining to the operations under this subchapter, or if the owner or his authorized agent fails or refuses to give correct information to the proper authorities, or fails or refuses to furnish the log of any well within 30 days after production is found in paying quantities, or if any of the material terms of the lease are violated, the lease is subject to forfeiture by the board by an order entered upon the minutes of the board reciting the facts constituting the default and declaring the forfeiture.

(b) The board may have suit instituted for forfeiture through the attorney general.

(c) On proper showing by the forfeiting owner, within 30 days after the declaration of forfeiture, the lease may, at the discretion of the board and on such terms as it may prescribe, be reinstated.

(d) In case of violation by the owner of the lease contract, the remedy of the state by forfeiture is not the exclusive remedy, but suit for damages or specific performance, or both, may be instituted.

(e) The state shall have a first lien upon all oil and gas produced upon the leased area and upon all rigs, tanks, pipeline, telephone lines, and machinery and appliances used in the production and handling of oil and gas produced thereon, to secure any amount due from the owner of the lease.

[Acts 1971, 62nd Leg., p. 3158, ch. 1024, art. 1, § 4, eff. Sept. 1, 1971.]

§ 66.77. Filing of Records

All surveys, files, records, copies of sale and lease contracts, and all other records pertaining to the sales and leases hereby authorized, shall be filed in the general land office and constitute archives thereof.

[Acts 1971, 62nd Leg., p. 3158, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.78. Payments; Disposition

Payments under this subchapter shall be made to the commissioner of the general land office at Austin, who shall:

(1) transmit to the state treasurer for deposit to the credit of the permanent university fund all bonus and royalty payments;

(2) transmit to the state treasurer for deposit to the credit of the available university fund all payments for delay in drilling, all filing, assignment, and relinquishment fees, and all other payments except those described in Subdivision (3) of this section; and

(3) transmit to the comptroller of The University of Texas System the special one percent fee payment prescribed by Section 66.65(e) of this code, which shall be disbursed by the comptroller for the authorized purposes after approval thereof by the board.

[Acts 1971, 62nd Leg., p. 3158, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.79. Forms; Contracts; Regulations

The board shall adopt forms and contracts and shall promulgate rules and regulations, not inconsistent with the terms of this subchapter, that in its judgment will best effectuate the purpose of this subchapter and will best protect the university, its lands, and the income from the lands.

[Acts 1971, 62nd Leg., p. 3159, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

§ 66.80. Expenses of Executing this Subchapter

The expenses of executing the provisions of this subchapter shall be paid monthly by warrants drawn by the comptroller on the state treasury.

[Acts 1971, 62nd Leg., p. 3159, ch. 1024, art. 1, § 1, eff. Sept. 1, 1971.]

CHAPTER 67. THE UNIVERSITY OF TEXAS AT AUSTIN

SUBCHAPTER A. GENERAL PROVISIONS

Section

67.01. Definitions.

67.02. The University of Texas at Austin.

SUBCHAPTER B. POWERS AND DUTIES OF BOARD

67.21. Special Fees.

67.22. Military Training.

67.23. Texas Memorial Museum.

67.24. Research and Experimentation for Highway Department.

SUBCHAPTER C. THE UNIVERSITY OF TEXAS McDONALD OBSERVATORY AT MOUNT LOCKE

67.51. Unit of University.

67.52. Programs.

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Economist: only time will tell

By ROSEMARY SHINAHARA
Daily News Staff Writer

Daniel A. Seiver, a University of Alaska economist who stirred some contention in economist circles when he made a computer-based forecast for unemployment and inflation in Alaska this year, is the first to admit that only time will tell.

"There's no guarantee a computer model will do better than an informed expert," he said in an interview. "To make a forecast you have to make assumptions."

SEIVER'S FORECAST was more pessimistic than those made by Bob Richards, an Alaska Pacific Bank economist, who has been making predictions about the state economy for several years.

Seiver, a member of the university's Institute of Social and Economic Research, said unemployment in Alaska will fall by 14 per cent below 1976 this year. Richards responded to the forecast in a letter to the Institute in which he cited what he considered defects in the computer model.

The employment decrease this year is likely to be less than the model's estimate of 14 per cent, Richards said. "A decline of less



Daniel A. Seiver

than 10 per cent and closer to about 5 per cent seems more probable."

THE INSTITUTE has been working to build a computer model that can be used for accurate long-range predictions for years. While long-term forecasts indicate the state will have "relatively

smooth and steady growth," recent experience has been of the "boom-bust" nature, Seiver says in a paper made public last week.

He spent several months developing equations to feed into a computer to produce a picture of economic activity for the year.

The prediction assumes that consumer prices in the U.S. will be up 7 per cent over last year, and U.S. wages will be up 8 per cent over 1976.

IN ALASKA, it was assumed mining, manufacturing, agriculture, forestry, and fisheries employment would be up 15 per cent, federal government employment would be unchanged, and pipeline employment would average about 5,000 persons.

How accurate the assumptions were, remains to be seen.

Meanwhile, Seiver said, "I think it's healthy to have a little controversy." More is on the horizon, in the form of separately created computer models being developed for the state Department of Economic Development.

WHEN THE STATE finishes its studies, Alaskans will have three economic forecasts to choose from.

But Seiver notes that none of them are pure computer, or pure informed expertise. They are influenced by each other. "People's forecasts tend to gravitate toward each other," he said.

Seiver has been with the institute since 1974, but previous papers have been in his main field — population studies. Gathering data for population studies is a problem, and the next major efforts in the field will probably be undertaken after the 1980 census, Seiver said.



UNIVERSITY OF ALASKA
FAIRBANKS, ALASKA 99701

15ER
PLEASE REPLY TO:
707 A Street, Suite 206
Anchorage, Alaska 99501

INSTITUTE OF SOCIAL & ECONOMIC RESEARCH

The Honorable Clark Gruening
Chairman
Committee on the Permanent Fund
Alaska House of Representatives
Juneau, Alaska 98111

May 16, 1977

Dear Mr. Gruening:

This is a letter proposal in response to the May 11 inquiry from your staff assistant, Brian Rogers, to Arlon R. Tussing, Adjunct Professor of Economics. The Institute of Social and Economic Research of the University of Alaska (ISER) proposes to conduct a study and produce a report under the direction and supervision of Professor Tussing on the following topics:

1. How efficient are capital markets in Alaska today? What amount of substitution of permanent fund for private capital would there be under approaches being considered for the permanent fund?
2. To what extent would permanent fund outlays have the ability to expand Alaska's tax base and diversify the Alaska economy?
3. Under four or five alternative management approaches for the permanent fund, what would be the investment impacts? What are the growth implications?
4. How would impacts differ if the permanent fund investments are out-of-state instead of in-state? What are the implications of using the permanent fund for social purposes (a) directly through loans, etc. or (b) indirectly, by expanding the economy to create a greater tax base, which could be used for social purposes in the future?
5. Could the permanent fund be used to stabilize the Alaska economy, to smooth the boom/bust cycle, or to even out the rate of growth?
6. Could the permanent fund be used to increase rural employment through cottage industries, or dispersal of economic activity?
7. What analytical or policy issues (whether included in the foregoing list or not) should the committee investigate in depth?

UNIVERSITY OF ALASKA

The Honorable Clark Gruening
May 16, 1977
Page 2

It is understood that the study and report proposed in this letter are to be in the nature of a general reconnaissance, and need not involve collection or processing of original quantitative data.

ISER will deliver to the Committee, within thirty (30) days of final acceptance of this proposal, one photo-ready reproducible copy of the final report.

The total price of the study and report is six thousand dollars (\$6,000), which price includes all professional effort, overhead, communications, supplies and travel, including one (1) day of testimony or briefings at a place in Alaska of the Committee's choosing, within thirty (30) days of delivery of the final report.

Your signature on this letter constitutes acceptance of the proposal contained in it. Any modifications proposed by you should be marked on the text and initialed, and the letter returned to ISER for our acceptance.

Sincerely,


Arlon R. Tussing, Professor of Economics


E. Lee Gorsuch, Director

ACCEPTED:

Title

AT/rk

ISER

25 ~~25~~ Long term Rev Proj
35 MAP model for FF

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Arlon: ~~SA~~ Sacramento
Seattle - SATURDAY

call inst

The Honorable Clark Greening
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Page 2

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Sincerely,



Arlon R. Tussing, Professor of Economics



E. Lee Gorsuch, Director

ACCEPTED:

Title

AT/rk

Send to
B. J. D. Doug
Court 647

Brian Rogers

PF: ISER



707 A Street, Suite 206
Anchorage, AK 99501

UNIVERSITY OF ALASKA

FAIRBANKS, ALASKA 99701

INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

March 25, 1977

Dear Sir or Madam:

You or any members of your organization are cordially invited to attend a one-day workshop, entitled "Economic Methods for Analysis of Alaska's Future." The workshop is sponsored by the University of Alaska's Institute of Social and Economic Research and will be held on Saturday, April 9, at the AMU campus, Student Union Building, commencing at 9 a.m.

The morning session of the workshop will concentrate on the economic relationships which allow one to model the behavior of the Alaska economy and analyze population growth and changes in levels and types of economic activities. The afternoon sessions will address an approach to (a) assessing the economic impact of fiscal policy options, such as lowering personal income taxes, and of large scale economic projects, such as gas pipelines or hydroelectric projects; and, (b) forecasting future demand requirements for manpower, energy and transportation. The workshop will conclude with a presentation of ISER's efforts to develop tools to assess who benefits from Alaska's growth.

The sessions will be conducted by members of ISER's economics staff assisted by Dr. David Kresge, a senior economist with the National Bureau of Economic Research. An agenda for the workshop and discussion materials will be available at the registration desk.

Lunch will be a brown bag affair and all participants are advised to bring their own lunch. Soft drinks and coffee will be available throughout the workshop.

A registration fee of \$5.00 per person will be collected at the door.

I hope you'll be able to attend.

Sincerely,

Lee Gorsuch

Lee Gorsuch
Director

LG/mm

Lee Gorsuch

NAP Computer capabilities
staff - memo on potential application

Dept Revenue is using old version of NAP

Both - prelim runs By 1985, P.F. \$3.6 billion
G.F. \$6 billion.

Raises on Q $\rightarrow$ how much \$ into P.F.

expenditures impact assessment
alternatives for \$6 of G.F. altering

1) improve q of life, living conditions

2) pupil/teacher, health care,

Develop series of indicators — quality of service
additional effort - capital market & flows

Doing whatever

Aplan, Scott Goldsmith

Consumption, Capital market data

By end of next week -

outline of things to do

My sched open $\rightarrow$ call Thursday

In Arch -
Fri. + weekend
Flx - Monday



REVIEW OF BUSINESS AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH APRIL 1974, Vol. XI, No. 1

ESTIMATED GROSS STATE PRODUCT FOR ALASKA

This Review presents a breakdown by industry of the estimated gross state product for Alaska. Gross state product or GSP is the total market value of all the goods and services produced in the state for a given period. The estimated GSP presented here provides a new way of measuring both volume and value of production in the state, and the results should prove valuable to economists, businessmen, and others who have an interest in the behavior of the state's economy. Use of an estimated GSP to measure Alaska production is similar to the way gross national product is used to measure total United States' production.*

Estimated GSP gives us the most complete measure of economic activity in Alaska. It differs from other measurements previously available because estimated GSP is based on a wider range of information sources and makes use of census data. Also, unlike previously available measures, the estimated GSP provided here has been adjusted to reflect "constant dollar" values (based on the 1958 dollar).

* However "gross national product" is not strictly analogous since it is not confined to production within the confines of a geographic boundary; GNP may also include production of U.S. owned industries in other countries. Gross state product as used here is confined to production within the boundaries of the state.

Estimating the Gross State Product

Table 1 compares 1961 with 1972 estimated GSP, as well as the gross product for each industrial sector. These figures were derived by either of two alternative ways: (1) by figuring how much the total value of a given industry's output exceeds the cost of materials used in production, or (2) by figuring the sum of the industry's payments for employee compensation, profits, and other such production costs as indirect business taxes and depreciation. The type of information available determined which method we used to estimate the gross product for a given industry. Calculated by either method, however, the sum of the gross products of all Alaska industries equals the state's output or GSP.

Price Deflators

When measured by current prices, many of the changes in gross product since 1961 have resulted from changes in price rather than changes in actual production. To measure and compare actual production, gross product was adjusted to compensate for price changes. This was done by dividing industry gross product (as shown in table 2) by the "price deflators" shown in tables 1 and 3.

Because employee compensation constitutes the major component of gross product in most in-

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AND ECONOMIC CONDITIONS

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Robert W. Hiatt — President, University of Alaska
Victor Fischer — Director of the Institute of Social, Economic
and Government Research

Ronald Crowe
Institute Editor

Authors: Dave T. Kresge
Monica E. Thomas

dustries, the bulk of the price deflators was derived by comparing changes in the cost of labor based on average annual employee earnings. In a few industries, the price deflators were calculated directly from changes in output prices.

"Real" GSP (adjusted for price changes) was estimated by dividing the GSP (at each year's prices) for each industry by a price deflator for that industry. The results are the "constant dollar" gross products shown in table 4. These show what the value of each year's Alaska product would have been if valued at 1958 *national* prices instead of 1958 *Alaska* prices. In other words, we adjusted the GSP for changes both in Alaska prices and for differences between prices in Alaska and the rest of the United States. The resulting GSP estimates provide consistent indicators of the physical volume of production in the major industrial sectors of Alaska.

Sources

In order to make use of the maximum amount of available information, the gross product estimates were derived from the largest possible variety of sources. The two major sources were the wage and salary estimates prepared by the Alaska Department of Labor and the industry data collected by the U.S. Bureau of the Census. The information concerning Alaska industry was obtained from the census of manufactures, commercial fisheries, mineral industries, construction industries, and government. In addition to these sources, some of the data was taken from Alaska personal income estimates and from the U.S. industry gross product estimates prepared by the U.S. Department of Commerce.

More complete information on data sources is contained in the appendix. The appendix also pro-

vides a detailed outline of the procedures used in computing the various gross product estimates.

Alaska Gross Product, 1961-1972

As table 1 shows, the Alaska GSP for 1972 is estimated to have been \$2.4 billion. GSP has grown at an average rate of nearly 10 percent a year since 1961. However, a large part of this growth represents price increases, not gains in actual production. The GSP deflator (a general price index for Alaska output) increased at nearly 4 percent a year and real output grew at 5.7 percent a year between 1961 and 1972.

Within the context of the relatively rapid growth in the total economy, there were significant changes in the industrial composition of production (see figure 1). The most striking change was in the mining sector, which grew quite rapidly due to expanded petroleum activities. The mining sector increased its share of total real output from 5.4 percent in 1961 to 17.5 percent in 1972. The other sectors experiencing above-average real growth were state and local government; transportation, communications, and public utilities; and trade, finance, and services. It is interesting to note that those last two industrial groups, the so-called support sectors, produced about 45 percent of total real GSP in 1972, and they accounted for more than half of the real growth between 1961 and 1972.

In contrast to the support sectors, the renewable resource-based industries grew at only 0.4 percent per year from 1961 to 1972, and their share of real GSP fell from 13.8 percent to 7.8 percent. Thus, two traditional Alaska industries, fisheries and forest products, have contributed very little to the real growth of the Alaska economy since statehood. Another traditional sector contributing little to growth was the federal government. Although the federal sector remains an important component of the Alaska economy, its growth in current prices was only moderate and, in real terms, its gross product actually declined slightly between 1961 and 1972. As a result, the federal government's share of real GSP was cut almost in half over that period.

Changes in Alaska Production, 1971-1972

In 1972, Alaska GSP increased by 7 percent

TABLE 1
ALASKA GROSS PRODUCT, 1961 AND 1972

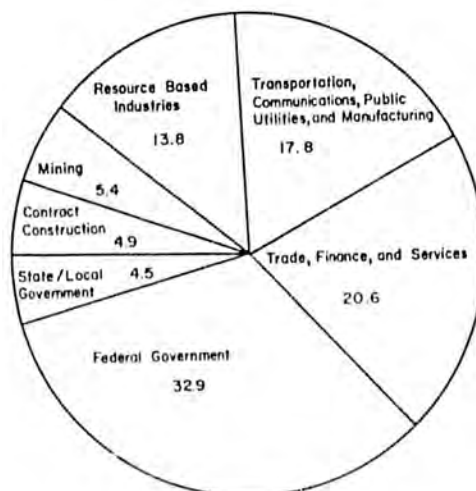
	GROSS PRODUCT IN CURRENT DOLLARS (Millions of Dollars at Current Prices)			GROSS PRODUCT IN CONSTANT DOLLARS (Millions of 1958 Dollars at Average U.S. Prices)			PRICE DEFLATORS (1958 U.S. Prices = 100)		
	1961	1972	Average Annual Rate of Change 1961-1972	1961	1972	Average Annual Rate of Change 1961-1972	1961	1972	Average Annual Rate of Change 1961-1972
All Industries, Total GSP	863.3	2416.3	9.8%	683.6	1253.0	5.7%	126.3	192.8	3.9%
Renewable Resource Industries	102.5	166.2	4.5	94.3	98.2	0.4	108.7	169.2	4.1
Agriculture	1.4	1.4	0						
Fisheries	74.0	94.8	2.3	71.1	57.0	-2.0	104.1	166.3	4.4
Forest Products	27.1	70.0	9.0	23.2	41.2	5.4	116.8	169.9	3.5
Mining (Including Petroleum)	37.1	224.0	17.8	36.9	219.1	17.6	100.5	102.2	0.2
Contract Construction	81.7	271.2	11.5	33.6	61.4	5.6	243.2	442.0	5.6
Manufacturing*	8.3	26.8	11.2	6.8	14.8	7.3	122.6	181.2	3.6
Transportation	47.0	120.9	9.0	42.5	90.2	7.1	110.6	134.0	1.8
Communications	65.4	104.9	4.4	60.8	94.2	4.1	107.5	111.4	0.3
Public Utilities	12.7	48.9	13.0	11.9	40.7	11.8	106.5	120.0	1.1
Trade	98.2	288.2	10.3	68.0	153.1	7.7	144.4	188.2	2.4
Wholesale	31.6	89.3	9.9	24.8	58.1	8.0	127.5	153.8	1.7
Retail	66.6	198.9	10.5	43.2	95.0	7.4	154.0	209.3	2.8
Finance, Insurance, and Real Estate	48.9	186.2	12.9	40.2	102.4	8.9	121.7	181.8	3.7
Services	57.5	187.2	11.3	32.4	80.1	8.6	177.5	233.7	2.5
Government	304.0	791.8	9.1	256.2	298.8	1.4	118.7	265.0	7.6
Federal	248.5	490.6	6.4	225.1	212.5	-0.5	110.4	230.9	6.9
State and Local	55.5	301.2	16.6	31.1	86.3	9.7	178.4	349.0	6.3

* Other than lumber, wood, and paper products or food (fish) processing

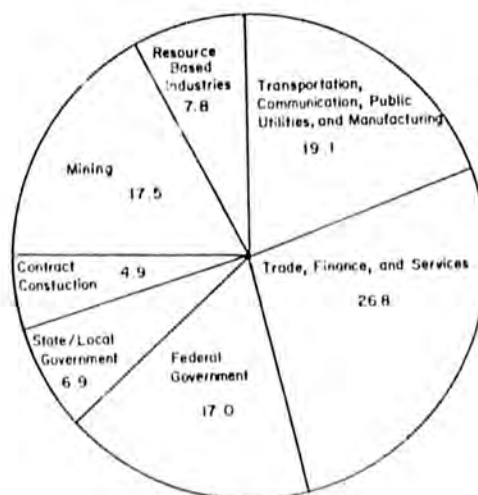
(see figure 2 and table 2). However, the price deflator is estimated to have increased by nearly 10 percent, so real GSP actually fell by 2.7 percent. The major factor causing this was the continuing decline in mining (petroleum) activity. The gross product in mining fell by 11 percent in current prices and by 20 percent in constant dollars. The resource-based industries other than mining also showed a substantial drop in output: 5 percent in

current prices and 16 percent in real terms. On the other hand, the support industries, state and local government, and contract construction all displayed strong growth, both in current prices and in real terms. The federal government had a decline in real output (employment), but this was more than offset by the increase in average wages paid, so output in current prices actually rose 5 percent.

FIGURE 1
DISTRIBUTION OF CONSTANT DOLLAR GROSS STATE PRODUCT,
1961 AND 1972



1961



1972

FIGURE 2
CHANGE IN ALASKA GROSS PRODUCT, 1971-1972
(Percent)

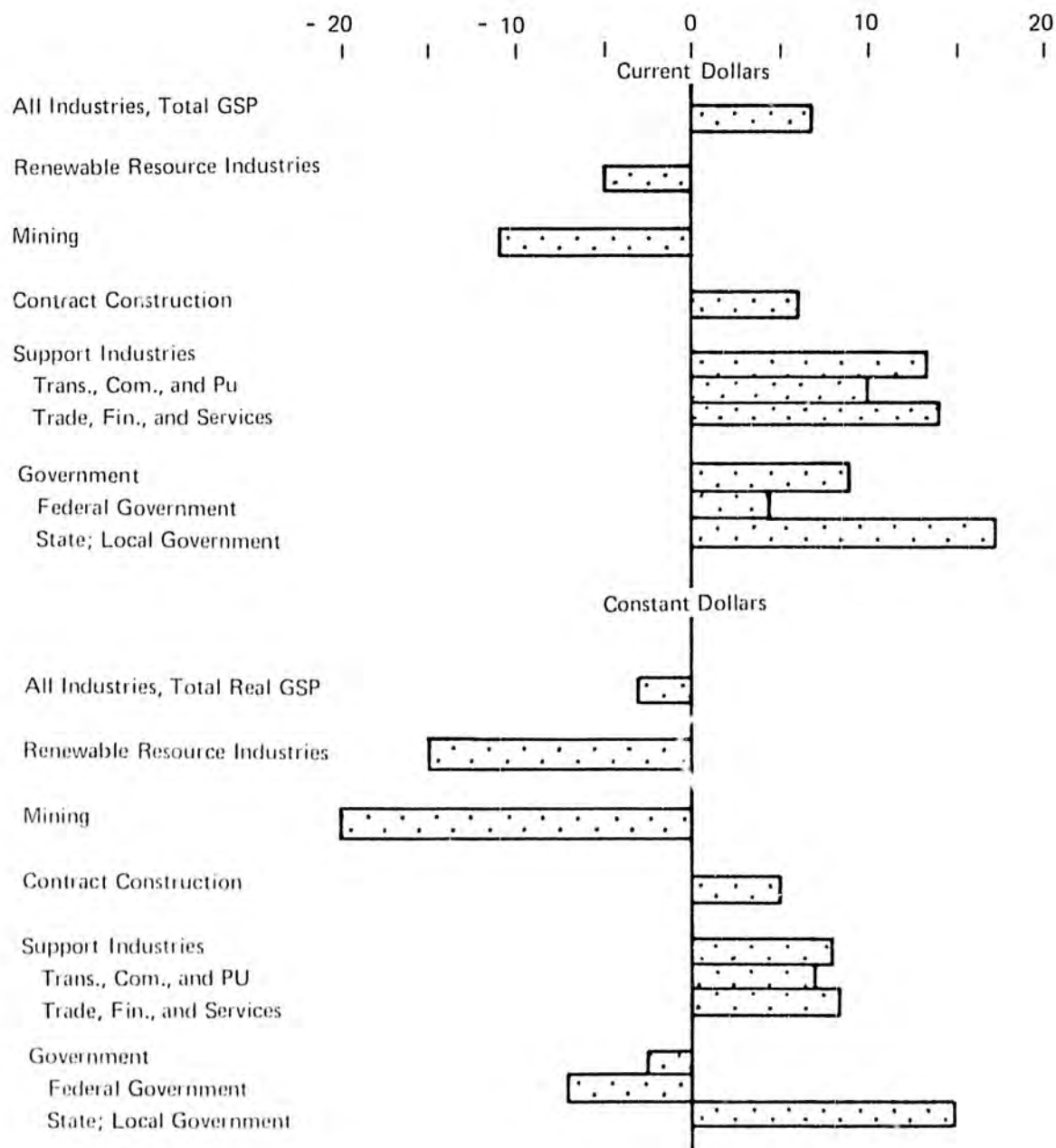


TABLE 2
ALASKA GROSS PRODUCT IN CURRENT DOLLARS BY INDUSTRY, 1961-1972
(Millions of Dollars)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
ALL INDUSTRIES	863.3	902.2	944.1	1089.3	1189.6	1305.1	1468.0	1662.4	1921.1	2116.6	2257.3	2416.3
AGRICULTURE, FORESTRY AND FISHERIES	27.5	34.2	27.7	33.3	40.6	47.1	28.0	46.0	39.0	55.8	49.4	50.0
ALL INDUSTRIES EXCEPT AGRICULTURE, FORESTRY AND FISHERIES	835.8	868.0	916.4	1056.0	1149.0	1258.0	1440.0	1616.4	1882.1	2060.8	2207.9	2366.3
Employee Compensation	582.7	603.8	640.9	729.7	785.6	848.5	947.2	1035.2	1184.7	1339.9	1461.8	1602.3
Indirect Business Tax	51.5	54.0	55.0	57.6	69.0	76.6	83.7	96.7	114.8	131.5	145.2	157.2
Other Factor Payments	201.6	210.2	220.5	268.7	294.4	332.9	409.1	484.5	582.6	589.4	600.9	606.8
MINING	37.1	41.9	44.4	46.3	46.6	65.9	158.3	220.1	334.4	301.3	250.6	224.0
Employee Compensation	12.6	13.8	13.8	13.7	14.4	19.1	30.7	41.3	61.2	56.4	47.5	42.7
Indirect Business Tax	2.7	3.2	3.4	3.4	3.6	5.3	9.5	13.6	19.9	19.2	16.6	14.5
Other Factor Payments	21.8	24.9	27.2	29.2	28.6	41.5	118.1	165.2	253.3	225.7	186.5	166.8
Metal Mining	3.5	3.2	2.6	1.8	2.3	2.5	2.1	1.8	2.0	3.4	2.8	1.9
Employee Compensation	3.1	2.9	2.3	1.6	2.0	2.2	1.8	1.7	1.9	3.2	2.4	1.8
Indirect Business Tax	.4	.4	.3	.2	.3	.3	.3	.2	.2	.4	.3	.2
Other Factor Payments	0	-.1	0	0	0	0	0	-.1	-.1	-.2	.1	-.1
Oil and Gas	28.6	33.4	36.9	39.1	38.1	57.2	150.8	213.5	328.1	293.5	242.1	215.9
Employee Compensation	6.7	7.9	8.7	9.1	8.9	13.4	25.9	36.9	56.9	50.7	41.9	37.4
Indirect Business Tax	2.2	2.6	2.9	3.0	3.1	4.8	9.0	13.2	19.6	18.7	16.1	14.1
Other Factor Payments	19.7	22.9	25.3	27.0	26.1	39.0	115.9	163.4	251.6	224.1	184.1	164.4
Other Mining	5.0	5.3	4.9	5.4	6.2	6.2	5.4	4.8	4.3	4.4	5.7	6.2
Employee Compensation	2.8	3.0	2.8	3.0	3.5	3.5	3.0	2.7	2.4	2.5	3.2	3.5
Indirect Business Tax	.1	.2	.2	.2	.2	.2	.2	.2	.1	.1	.2	.2
Other Factor Payments	2.1	2.1	1.9	2.2	2.5	2.5	2.2	1.9	1.8	1.8	2.3	2.5
CONTRACT CONSTRUCTION	81.7	83.3	89.9	137.3	155.9	158.5	170.7	180.0	211.3	223.8	254.3	271.2
Employee Compensation	50.6	51.6	55.9	84.8	96.1	97.7	104.5	109.9	129.8	138.7	158.0	170.6
Indirect Business Tax	1.7	1.8	1.8	2.6	3.1	3.2	3.3	3.7	3.9	4.3	5.0	5.5
Other Factor Payments	29.4	29.9	32.2	49.9	56.7	57.6	62.9	66.4	77.6	80.8	91.3	95.1
MANUFACTURING	83.3	79.0	78.0	95.2	105.2	116.9	103.5	125.7	111.6	144.5	149.7	143.0
Employee Compensation	43.8	45.8	48.6	50.8	60.6	62.5	62.5	70.5	77.5	94.3	98.0	102.2
Indirect Business Tax	9.3	7.9	7.8	7.9	10.7	11.0	9.3	10.4	10.7	13.5	13.8	13.4
Other Factor Payments	30.2	25.3	21.6	36.5	33.9	43.4	31.7	44.8	23.4	36.7	37.9	27.4
Food and Kindred Products	47.9	38.3	33.1	46.5	52.0	62.7	44.1	60.6	37.6	59.3	60.1	46.2
Employee Compensation	22.1	20.7	20.6	20.3	26.7	27.1	22.5	26.1	26.8	35.5	35.6	34.5
Indirect Business Tax	8.1	6.5	6.3	6.3	9.1	9.4	7.6	8.3	8.4	10.8	11.0	10.5
Other Factor Payments	17.7	11.1	6.2	19.9	16.2	26.2	14.0	26.2	2.4	13.0	13.5	1.2
Lumber and Wood Products	7.3	8.0	10.0	11.3	13.3	16.5	23.5	25.1	26.5	31.3	32.0	34.7
Employee Compensation	5.6	6.2	7.9	8.7	10.4	12.9	18.5	19.8	21.0	24.7	25.4	27.7
Indirect Business Tax	.2	.2	.3	.3	.3	.4	.6	.7	.7	.8	.8	.9
Other Factor Payments	1.5	1.6	1.8	2.3	2.6	3.2	4.4	4.6	4.8	5.8	5.8	6.1
Paper and Allied Products	19.8	23.1	24.9	26.1	27.3	25.2	21.6	24.7	27.8	31.4	32.7	35.3
Employee Compensation	9.7	11.3	12.2	12.8	13.4	12.4	11.5	12.2	13.7	15.7	16.4	17.7
Indirect Business Tax	.3	.4	.4	.4	.4	.4	.4	.4	.4	.5	.5	.6
Other Factor Payments	9.8	11.4	12.3	12.9	13.5	12.4	11.6	12.1	13.7	15.2	15.8	17.0
Other Manufacturing	8.3	9.6	10.0	11.3	12.6	12.5	12.3	15.3	19.7	22.5	24.9	26.8
Employee Compensation	6.4	7.6	7.9	9.0	10.1	10.1	9.9	12.4	16.0	18.4	20.6	22.3
Indirect Business Tax	.7	.8	.8	.9	.9	.8	.7	1.0	1.2	1.4	1.5	1.4
Other Factor Payments	1.2	1.2	1.3	1.4	1.6	1.6	1.7	1.9	2.5	2.7	2.8	3.1
TRANSPORTATION	47.0	49.9	52.8	56.8	63.5	66.1	74.9	77.9	100.8	106.3	107.3	120.9
Employee Compensation	34.1	35.5	37.0	39.1	41.8	43.9	51.5	55.2	73.2	80.1	76.4	84.8
Indirect Business Tax	4.1	3.8	3.3	3.2	3.6	3.8	4.1	4.4	5.6	6.4	8.3	9.7
Other Factor Payments	8.8	10.6	12.5	14.5	18.1	18.4	19.3	18.3	22.0	19.8	22.6	26.4

Table 2 (continued)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
TRANSPORTATION (cont.)												
Trucking and Warehousing	9.7	10.8	11.5	13.5	16.7	13.2	17.2	18.6	26.7	30.6	27.2	28.6
Employee Compensation	6.5	7.2	7.6	9.1	11.0	8.8	12.0	12.8	18.8	21.0	19.3	20.7
Indirect Business Tax	.7	.8	.9	1.0	1.2	1.0	1.0	1.1	1.5	1.8	1.6	1.6
Other Factor Payments	2.5	2.8	3.0	3.4	4.5	3.4	4.2	4.7	6.4	7.8	6.3	6.3
Water Transportation	9.3	10.0	10.4	10.1	9.2	12.2	12.3	11.7	10.4	11.0	10.2	12.8
Employee Compensation	8.0	8.8	8.7	8.3	7.6	9.9	10.2	9.5	9.0	9.4	9.0	11.1
Indirect Business Tax	.4	.3	.3	.2	.2	.3	.3	.3	.3	.3	.4	.5
Other Factor Payments	.9	.9	1.4	1.6	1.4	2.0	1.8	1.9	1.1	1.3	.8	1.2
Air Transportation	23.8	24.6	26.3	28.8	32.5	34.9	38.8	40.2	55.4	54.9	58.7	68.5
Employee Compensation	16.6	16.4	17.6	18.7	19.9	21.5	24.9	28.0	39.8	43.0	40.5	45.6
Indirect Business Tax	2.7	2.3	1.7	1.7	1.8	2.0	2.2	2.3	3.0	3.3	5.2	6.4
Other Factor Payments	4.5	5.9	7.0	8.4	10.8	11.4	11.7	9.9	12.6	8.6	13.0	16.5
Other Transportation	4.2	4.5	4.6	4.4	5.1	5.8	6.6	7.4	8.3	9.8	11.2	11.0
Employee Compensation	3.0	3.1	3.1	3.0	3.3	3.7	4.4	4.9	5.6	6.7	7.6	7.4
Indirect Business Tax	.3	.4	.4	.3	.4	.5	.6	.7	.8	1.0	1.1	1.2
Other Factor Payments	.9	1.0	1.1	1.1	1.4	1.6	1.6	1.8	1.9	2.1	2.5	2.4
COMMUNICATIONS	65.4	61.5	61.1	58.9	62.1	67.4	64.3	67.4	68.6	71.3	98.1	104.9
Employee Compensation	30.9	27.9	26.8	26.4	27.6	30.1	28.4	29.9	31.6	34.6	47.3	51.3
Indirect Business Tax	8.5	8.0	7.6	7.0	7.5	7.2	8.0	8.0	8.2	8.9	12.2	12.6
Other Factor Payments	26.0	25.6	26.7	25.5	27.0	30.1	27.9	29.5	28.8	27.8	38.6	41.0
PUBLIC UTILITIES	12.7	15.5	17.6	20.4	23.7	24.9	27.9	31.0	33.5	36.5	43.8	48.9
Employee Compensation	4.2	5.0	5.6	6.6	7.6	8.0	9.0	10.1	11.1	12.7	14.8	16.5
Indirect Business Tax	1.3	1.7	1.8	2.0	2.5	2.5	3.0	3.5	3.8	4.4	5.3	5.8
Other Factor Payments	7.2	8.8	10.2	11.8	13.6	14.4	15.9	17.4	18.6	19.4	23.7	26.6
TRADE	98.2	101.1	104.5	113.5	131.8	147.3	165.5	184.3	215.7	241.1	263.9	288.2
Employee Compensation	57.2	57.1	60.6	65.5	76.3	85.1	96.4	106.8	126.3	142.9	154.7	172.1
Indirect Business Tax	14.4	16.1	16.5	17.5	21.1	24.9	27.8	32.9	39.2	45.4	50.6	56.5
Other Factor Payments	26.2	26.9	27.4	30.5	34.4	37.3	41.3	44.6	50.2	52.8	58.6	59.6
Wholesale Trade	31.6	29.1	29.7	33.7	37.8	45.1	50.3	56.0	70.0	79.0	82.2	89.3
Employee Compensation	17.5	15.7	16.2	18.5	20.7	24.5	27.9	30.5	38.4	44.0	45.3	50.0
Indirect Business Tax	6.6	6.7	6.7	7.3	8.7	10.6	11.8	13.7	17.1	19.7	21.5	23.4
Other Factor Payments	7.5	6.7	6.8	7.9	8.4	10.0	10.6	11.8	14.5	15.3	15.4	15.9
Retail Trade	66.6	71.0	74.8	79.8	94.0	102.2	115.2	128.3	145.7	162.1	181.7	198.9
Employee Compensation	39.7	41.4	44.4	47.0	55.6	60.6	68.5	76.3	87.9	98.9	109.4	122.1
Indirect Business Tax	7.8	9.4	9.8	10.2	12.4	14.3	16.0	19.2	22.1	25.7	29.1	33.1
Other Factor Payments	19.1	20.2	20.6	22.6	26.0	27.3	30.7	32.8	35.7	37.5	43.2	43.7
FINANCE, INSURANCE AND REAL ESTATE	48.9	56.8	64.8	73.2	86.7	96.0	94.7	101.7	113.8	138.3	157.4	186.2
Employee Compensation	10.3	11.7	13.5	15.3	17.7	19.6	19.8	22.3	25.4	31.3	35.6	43.2
Indirect Business Tax	7.8	9.6	10.8	11.9	14.4	16.2	16.3	17.4	20.4	25.7	29.3	34.4
Other Factor Payments	30.8	35.5	40.5	46.0	54.6	60.2	58.6	62.0	68.0	81.3	92.5	108.6
SERVICES	57.5	63.0	62.7	69.9	78.3	84.9	96.5	109.7	126.8	144.1	160.0	187.2
Employee Compensation	35.0	38.4	38.5	43.0	48.3	52.4	60.7	70.6	83.0	95.3	106.7	127.1
Indirect Business Tax	1.7	1.9	2.0	2.1	2.5	2.5	2.4	2.8	3.1	3.7	4.1	4.8
Other Factor Payments	20.8	22.7	22.2	24.8	27.5	30.0	33.4	36.3	40.7	45.1	49.2	55.3
Hotels, Motels, and Lodges	-	-	6.6	7.3	9.6	11.4	12.5	12.4	13.6	15.0	16.8	18.5
Employee Compensation	-	-	3.9	4.4	5.7	6.6	7.3	7.3	8.3	9.2	10.5	11.9
Indirect Business Tax	-	-	.5	.5	.7	.8	.8	.8	.9	1.1	1.2	1.3
Other Factor Payments	-	-	2.2	2.4	3.2	4.0	4.4	4.3	4.4	4.7	5.1	5.3
Personal Services	-	-	6.1	6.4	6.7	7.3	7.6	8.6	8.7	9.5	10.2	10.7
Employee Compensation	-	-	3.5	3.6	3.9	4.2	4.4	5.0	5.2	5.7	6.1	6.4
Indirect Business Tax	-	-	.2	.2	.2	.2	.2	.3	.3	.3	.4	.4
Other Factor Payments	-	-	2.4	2.6	2.6	2.9	3.0	3.3	3.2	3.5	3.7	3.9

Table 2 (continued)

[illegible]

TABLE 3
PRICE DEFLATORS FOR ALASKA GROSS PRODUCT BY INDUSTRY
(1958 Prices = 100 for U.S. Average)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
ALL INDUSTRIES	126.3	128.1	130.2	139.6	142.8	145.0	146.2	150.5	152.7	164.0	175.3	192.8
AGRICULTURE, FORESTRY, AND FISHERIES	88.9	101.5	97.1	94.9	117.0	111.1	124.0	153.9	156.3	148.6	161.1	246.1
MINING	100.5	99.5	96.5	93.0	95.3	89.8	87.7	91.9	92.2	94.2	91.7	102.2
Metal Mining	100.0	89.3	92.0	90.4	89.0	102.9	60.6	79.8	80.1	91.3	73.1	76.0
Oil and Gas	97.5	97.0	94.1	89.7	90.7	85.7	87.2	91.5	91.7	93.6	91.3	101.7
Other Mining	122.3	128.9	122.3	129.5	142.7	142.7	129.6	118.9	182.6	186.0	133.4	142.8
CONTRACT CONSTRUCTION	243.2	255.2	263.7	303.3	295.6	333.8	352.0	371.3	394.3	409.9	436.8	442.0
MANUFACTURING	118.7	119.0	121.7	123.0	127.4	127.1	128.7	133.0	140.6	145.5	148.8	154.3
Food and Kindred Products	119.3	117.0	115.7	118.9	124.0	119.8	116.5	119.4	121.6	127.2	128.5	125.9
Lumber and Wood Products	134.9	143.7	141.9	151.4	148.6	153.5	169.7	178.2	185.1	199.4	195.1	207.5
Paper and Allied Products	111.1	110.1	117.0	115.2	117.2	122.5	119.1	127.0	127.7	130.0	138.6	144.2
Other Manufacturing	122.6	135.0	138.7	139.1	149.6	149.5	138.6	150.0	159.2	175.1	180.0	181.2
TRANSPORTATION	110.6	113.9	113.5	114.1	113.6	108.7	109.5	107.2	112.6	118.5	129.9	134.0
Trucking and Warehousing	108.2	112.8	116.3	120.1	120.6	124.2	125.9	130.2	142.0	141.2	144.2	144.7
Water Transportation	111.5	115.1	118.1	116.0	120.4	120.6	136.3	138.1	134.9	145.7	149.0	158.2
Air Transportation	108.2	111.5	104.9	105.9	102.2	95.0	92.5	86.8	94.1	97.8	112.8	119.5
Other Transportation	129.6	131.2	172.5	165.2	191.0	170.3	175.9	207.0	202.9	222.2	227.5	219.5
COMMUNICATIONS	107.5	107.0	107.5	108.4	108.3	109.2	109.8	109.7	111.1	110.9	109.9	111.4
PUBLIC UTILITIES	106.5	105.6	107.9	107.5	107.1	108.2	110.7	113.2	112.4	115.7	116.8	120.0
TRADE	144.4	144.2	146.4	151.1	154.7	156.9	160.8	166.2	172.3	175.6	181.1	188.2
Wholesale Trade	127.5	120.4	122.4	126.8	127.1	132.0	131.6	135.3	141.8	145.0	147.5	153.8
Retail Trade	154.0	157.2	158.8	164.5	169.3	171.3	178.0	184.7	192.1	195.8	202.0	209.3
FINANCE, INSURANCE, AND REAL ESTATE	121.7	122.1	124.7	131.1	136.5	142.2	143.1	147.2	158.0	162.1	174.7	181.8
SERVICES	177.5	183.1	167.2	164.5	171.0	178.0	182.4	194.5	203.5	211.0	219.5	233.7
Hotels, Motels, and Lodges			186.0	161.1	188.8	200.0	203.2	204.5	199.0	205.6	220.6	222.0
Personal Services			159.1	131.5	153.5	163.4	170.5	169.7	175.8	170.9	181.7	188.5
Business Services			163.1	167.7	161.6	168.3	176.8	204.6	205.3	187.6	174.2	168.8
Medical Services			142.5	157.3	154.1	159.9	163.9	167.1	187.1	210.6	235.8	267.8
Other Services			181.9	178.6	186.3	191.6	194.6	207.0	217.8	234.3	242.8	255.8
GOVERNMENT	118.7	120.4	125.2	139.2	139.1	148.2	162.6	176.3	190.3	215.6	235.7	265.0
Federal Government	110.4	110.2	112.7	127.2	124.1	131.7	145.3	155.8	167.5	189.8	203.6	230.9
State and Local Government	178.4	187.0	198.3	209.1	215.8	227.4	240.6	261.5	275.8	303.4	332.1	349.0

TABLE 4
ALASKA GROSS PRODUCT IN CONSTANT DOLLARS BY INDUSTRY, 1961-1972
(Millions of 1958 Dollars at Average U.S. Prices)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
ALL INDUSTRIES	683.6	704.3	725.3	780.3	832.9	900.2	1003.8	1104.5	1258.4	1290.8	1287.5	1253.0
AGRICULTURE, FORESTRY, AND FISHERIES	30.9	33.7	28.5	35.1	34.7	42.4	22.6	29.9	25.0	37.6	30.7	20.3
MINING	36.9	42.1	46.0	49.8	48.9	73.4	180.6	239.6	362.7	319.7	273.3	219.1
Metal Mining	3.5	3.6	2.8	2.0	2.6	2.4	3.5	2.3	2.5	3.7	3.8	2.5
Oil and Gas	29.3	34.4	39.2	43.6	42.0	66.7	172.9	233.3	357.8	313.6	265.2	212.3
Other Mining	4.1	4.1	4.0	4.2	4.3	4.3	4.2	4.0	2.4	2.4	4.3	4.3
CONTRACT CONSTRUCTION	33.6	32.6	34.1	45.3	52.7	47.5	48.5	48.5	53.6	54.6	58.2	61.4
MANUFACTURING	70.2	66.4	64.1	77.4	82.6	92.0	80.4	94.5	79.4	99.3	100.6	92.7
Food and Kindred Products	40.2	32.7	28.6	39.1	41.9	52.3	37.9	50.8	30.9	46.6	46.8	36.7
Lumber and Wood Products	5.4	5.6	7.0	7.5	9.0	10.7	13.8	14.1	1.3	15.7	16.4	16.7
Paper and Allied Products	17.8	21.0	21.3	22.7	23.3	20.6	19.8	19.4	21.8	24.2	23.6	24.5
Other Manufacturing	6.8	7.1	7.2	8.1	8.4	8.4	8.9	10.2	12.4	12.8	13.8	14.8
TRANSPORTATION	42.5	43.8	46.5	49.8	55.9	60.8	63.4	72.7	89.5	89.7	82.6	90.2
Trucking and Warehousing	9.0	9.6	9.9	11.2	13.8	10.6	13.7	14.3	18.8	21.7	18.9	19.8
Water Transportation	8.3	8.7	8.8	8.7	7.6	10.1	9.0	8.5	7.7	7.5	6.8	8.1
Air Transportation	22.0	22.1	25.1	27.2	31.8	36.7	41.9	46.3	58.9	56.1	52.0	57.3
Other Transportation	3.2	3.4	2.7	2.7	2.7	3.4	3.8	3.6	4.1	4.4	4.9	5.0
COMMUNICATION	60.8	57.5	56.8	54.3	57.3	61.7	58.6	61.4	61.7	64.3	89.3	94.2
PUBLIC UTILITIES	11.9	14.7	16.3	19.0	22.1	23.0	25.2	27.4	29.8	31.5	37.5	40.7
TRADE	68.0	69.4	71.4	75.1	85.2	93.9	102.9	110.9	125.2	137.3	145.7	153.1
Wholesale Trade	24.8	24.2	24.3	26.6	29.7	34.2	38.2	41.4	49.4	54.5	55.7	58.1
Retail Trade	43.2	45.2	47.1	48.5	55.5	59.7	64.7	69.5	75.8	82.8	90.0	95.0
FINANCE, INSURANCE, AND REAL ESTATE	40.2	46.5	52.0	55.8	63.5	67.5	66.2	69.1	72.0	85.3	90.1	102.4
SERVICES	32.4	34.4	37.5	42.5	45.8	47.7	52.9	56.4	62.3	68.3	72.9	80.1
Hotels, Motels, and Lodges	-	-	3.5	4.5	5.1	5.7	6.2	6.1	6.8	7.3	7.6	8.3
Personal Services	-	-	3.8	4.9	4.4	4.5	4.5	5.1	4.9	5.6	5.6	5.7
Business Services	-	-	7.7	9.2	10.7	10.6	12.2	13.8	16.0	14.8	15.6	15.1
Medical Services	-	-	8.9	9.2	9.7	10.4	11.0	11.3	12.5	13.9	15.1	17.5
Other Services	-	-	13.6	14.7	15.9	16.5	19.0	20.1	22.1	26.7	29.0	33.5
GOVERNMENT	256.2	263.2	272.1	276.2	284.2	290.3	297.5	294.1	297.2	302.2	306.6	298.8
Federal Government	225.1	228.0	232.5	235.5	238.0	240.3	243.6	237.0	234.5	234.4	229.8	212.5
State and Local Government	31.1	35.2	39.6	40.7	46.2	50.0	53.9	57.1	62.7	68.8	76.8	86.3

APPENDIX
PROCEDURES FOR ESTIMATING
GROSS STATE PRODUCT BY INDUSTRY

APPENDIX

PROCEDURES FOR ESTIMATING
GROSS PRODUCT BY INDUSTRY

Industrial Classification

In estimating gross product, economic activity in Alaska was classified into the following eleven industrial sectors:

1. Agriculture, forestry, and fisheries
2. Mining
3. Contract construction
4. Manufacturing
5. Transportation
6. Communications
7. Public utilities
8. Trade
9. Finance, insurance, and real estate
10. Services
11. Government

Certain sectors were further broken down by splitting them into industrial components as follows:

1. Mining
 - Metal mining
 - Oil and gas
 - Other mining
2. Manufacturing
 - Food and kindred products
 - Lumber and wood products
 - Paper and allied products
 - Other manufacturing
3. Transportation
 - Trucking and warehousing
 - Water transportation
 - Air transportation
 - Other transportation
4. Trade
 - Wholesale trade
 - Retail trade
5. Services
 - Hotel, motels, and lodges
 - Personal services
 - Business services
 - Medical services
 - Other services
6. Government
 - Federal government
 - State and local government

In the six industrial sectors listed above, separate estimates were made for each of the industrial components. The results were then summed to obtain the sector totals.

Gross Product—Direct Estimates

Gross product estimates for the first four industrial sectors (agriculture, forestry, and fisheries; mining; contract construction; and manufacturing) were based on various sources of direct information concerning industrial production. In most cases, census data were also used to provide important check points for the estimates.

Agriculture, Forestry, and Fisheries

In Alaska, the forestry industry, as defined by the Bureau of the Census, generates negligible gross product. This occurs because the Census Bureau includes almost the entire forest products industry in the manufacturing sector as lumber and paper products. Gross product estimates for Alaska fisheries and agriculture were obtained using the following procedures:

Agriculture: The agriculture gross product was taken to be equal to the farm earnings reported in the personal income statistics.¹ Farm earnings include wages, salaries, and proprietors' incomes.

Fisheries: Alaska fisheries data were obtained from the 1967 census of commercial fisheries.² Alaska value added was estimated from census data on the basis of gross receipts, operating cost, and depreciation. Depreciation in the production process for Alaska was estimated using the relationship between depreciation and operating cost data for total U.S.² This was done by first figuring the ratio of depreciation to total operating costs for the U.S. This ratio was then multiplied by Alaska operating costs to obtain an estimate of Alaska depreciation and an estimate of operating costs excluding depreciation. Value added was then calculated by subtracting operating costs, excluding depreciation, from gross receipts. Alaska value added was divided by gross receipts from the Alaska census. To obtain the Alaska fisheries gross products, the resulting ratio was multiplied by the value to Alaska fishermen³ of the 1961-1972 catch. Data on value of the 1972 catch are not yet available, so a rough estimate was made based on preliminary press reports.

Because forestry production is negligible, fishing and

agriculture gross products were added to obtain the cumulative gross product for the agriculture, forestry, and fisheries category for 1961-1972. On the average, commercial fishing accounted for 97 percent of the gross product in this industrial sector.

Mining

Mining was divided into three components: metal mining, oil and gas, and other mining. Gross product estimates were calculated separately for each component; the procedure was similar for all three.

Mineral industries census data for 1963 and 1967 were obtained for the U.S.^{4,5} and Alaska.^{6,7} These data included value added and payrolls in metal mining, oil and gas, and other mining. Data were also obtained on U.S. gross product estimates for 1963 and 1967 from the gross product originating series.⁸

Value added from the gross product originating series was divided by U.S. value added in mining (from the census) for each of the three components, and the result was an adjustment factor for each component in 1963 and 1967. These adjustment factors were multiplied by value added (from the Alaska census) in mining, yielding adjusted value added for Alaska metal mining, oil and gas, and other mining. The purpose of the adjustment is to make the final estimates consistent with the concepts used by the U.S. Bureau of Economic Analysis to determine the Gross National Product.

The adjusted Alaska value-added data were divided by Alaska census payroll data for each component. These ratios were calculated for both 1963 and 1967. For metal and other mining, the 1963 and 1967 ratios were each averaged and then multiplied by 1961-1972 Alaska wages and salaries to obtain gross product estimates by year in each of the two industries. For the oil and gas industry, the 1963 ratio was multiplied by Alaska wages and salaries from 1961-1966. The 1967 ratio was multiplied by 1967-1972 Alaska oil and gas wages and salaries.⁹ The ratio was shifted to the 1967 level because of the structural change that resulted from the Cook Inlet oil fields coming into production in 1967.

Lease acquisition charges — bonuses and rentals — (for which the state received almost \$1 billion in 1969) are not treated in the accounts as income originating in current production. Instead, they are considered as capital expenditures that enter value added as capital consumption allowances (percentage depletion or cost depletion) over the productive life of the leases. The 1969 lease bonus payments, for example, will appear as part of the value of production in future years, under the heading "other factor income."

Contract Construction

For the purposes of calculation, contract construction was broken down into three small subcategories: 1) building construction—general contractors, 2) construction other than building—general contractors, and 3) construction—special trade contractors.¹⁰ Data on value added and payroll for these three were calculated from the 1967 census on the U.S.¹¹ and Alaska.¹² The gross product estimate for 1967 U.S. contract construction was obtained from the gross product originating (GPO) series.¹³ The ratio of U.S. GPO value added to U.S. census value added was calculated. This ratio was multiplied by Alaska census value added components to obtain adjusted value added estimates for Alaska. The adjusted Alaska value added estimates were divided by Alaska census payrolls, yielding a ratio for contract construction. These ratios were then multiplied by Alaska wages and salaries⁹ from the three component industries, 1961-1972, to obtain Alaska gross product estimates. The three sets of gross product estimates were summed to obtain Alaska contract construction gross product estimates for 1961-1972.

Manufacturing

Food and Kindred Products: Gross product estimates for 1963 and 1967 U.S. food and kindred products were obtained from the gross product originating (GPO) series.⁸ Estimates of value added by manufacture of food and kindred products were obtained for the U.S.^{14,15} and Alaska^{16,17} from the 1963 census and 1967 census. For 1963 and 1967, ratios were obtained of U.S. gross product estimates (from the GPO series) to value added by manufacture (from Census of Manufactures). These ratios were multiplied, respectively, by Alaska value added (from Census of Manufactures) by manufacture in 1963 and 1967. This yielded an adjusted Alaska value-added estimate for those years. Material costs were measured as wholesale value of fishery products minus value to fishermen of catch³ minus value added. Estimates of material costs were obtained from census data for 1963 and 1967. For these years, material costs were divided by wholesale value of fisheries products. The resulting two ratios were averaged. "K" was defined as the average ratio of material costs to wholesale value. Estimated Alaska gross product for food and kindred products by year was defined as (1-K) times the wholesale value of fisheries products by year minus the value to fishermen of catch. This relationship was used to calculate gross product estimates of 1961-1971 Alaska food and kindred products.

Because 1972 data were not yet available at the time of

writing, rough estimates of the value of catch were used to estimate gross product in 1972.

Lumber and Wood Products: U.S.^{14,15} and Alaska^{16,17} data were collected from the 1963 and the 1967 census on value added by manufacture of lumber and wood products. U.S. gross product estimates were also obtained from the gross product originating series.⁸ For 1963 and 1967, U.S. value added estimates from the GPO series were divided by value added estimates from the U.S. census. The resulting ratios were multiplied by 1963 and 1967 value added estimates from the Alaska census. These two estimates were divided, respectively, by wages and salaries from 1963 and 1967 Alaska lumber and wood products.⁹ To obtain gross product estimates for 1961-1972, the resulting two ratios were averaged, and the average ratio was multiplied by wages and salaries from 1961-1972 Alaska lumber and wood products wages and salaries.⁹

Paper and Allied Products: Alaska census data on paper and allied products were unavailable due to disclosure regulations. U.S. census data^{14,15,18} for 1958, 1963, and 1967 were collected on value added and payrolls. U.S. gross product estimates were also collected from the gross product originating series⁸ for those years. Value added to payroll ratios were obtained for paper and allied products. The ratios for the three years were averaged. Ratios were obtained of (GPO) value added to (census) value added in U.S. paper and allied products. These three ratios were then averaged to obtain an adjustment factor to convert census estimates to national income concepts. The two sets of averaged ratios were multiplied. The resulting ratio was multiplied by Alaska paper and allied products, wages, and salaries⁹ from 1961-1972 to obtain gross product estimates for those years.

Other Manufacturing: "other manufacturing" in Alaska consists primarily of printing and publishing; chemicals; stone, clay, and glass products; machinery; and transportation equipment. Value added by manufacture for 1963 and 1967 was obtained from U.S. census data for the above four categories. U.S. gross product estimates⁸ for the same years were obtained from the gross product originating series. Adjustment factors were computed as the ratios of value added (from GPO) to value added (from census) for the four categories for 1963 and 1967. Data from the Alaska census^{16,17} on value added by manufacture and payroll for the four categories were obtained for 1963; data on printing and publishing only were available for 1967. The adjustment factors derived from U.S. census data were multiplied by the Alaska ratios to make the Alaska value added estimates

consistent with national income concepts. Ratios of adjusted value added to payroll were calculated for the four categories. The resulting ratios were used to compute 1963 and 1967 weighted averages, using Alaska wages and salaries⁹ in the four categories as weights. The resulting two weighted averages were averaged to produce a final estimate of the ratio of value added to payroll in "other manufacturing." This ratio was multiplied by 1961-1972 Alaska "other manufacturing" wages and salaries⁹ to obtain estimates of gross product for "other manufacturing" in Alaska.

Gross Product—Estimates of Factor Payments

In those industries where there was no direct information available concerning value added, the estimates of gross product were obtained by adding factor payments. Since value added in an industry is equal to the sum of all payments made to factors of production, factor payments were divided into three categories: employee compensation, indirect business taxes, and other factor payments. The sections below describe how each of these components was estimated. Employee compensation and indirect business taxes were estimated for all industries. However, other factor payments were directly estimated only for those industrial sectors not discussed above. In the industrial sectors that had gross product estimated directly, other factor payments were treated as a residual; they were equal to gross product minus employee compensation and indirect business taxes.

Employee Compensation

Employee compensation is equal to wages and salaries plus supplements. Data on employee compensation in Alaska were lacking, but Alaska wage and salary information was available¹⁹. This is feasible since supplements have a relatively fixed relationship to wages and salaries, the ratios of U.S. employee compensation to U.S. wages and salaries²⁰ for twenty-four U.S. industries were multiplied by Alaska wages and salaries for the same twenty-four industries over the period 1961-72. The resulting data were estimates of Alaska employee compensation by industry.

Accurate wage and salary information was lacking for agriculture, forestry, and fisheries, so it was impossible to develop separate estimates of employee compensation, fisheries, so it was impossible to develop separate estimates of employee compensation, indirect business tax, and other cost data in that industry. Also, in 1961 and 1962, employee compensation, indirect business tax, and other costs were only

available for total services, but not for the components of the service sector.

Estimates of Alaska indirect business taxes for each industry, 1961-1972, were derived from U.S. and Alaska data as follows:

1. Government receipts of federal and state-local indirect business taxes were derived from tables 3.1 and 3.3 of the National Income and Product Accounts of the United States, 1961-1972.²¹ The percentages of total receipts allocated to federal and state-local government were calculated.

2. The above percentages were used to split total indirect business taxes for all industries, as shown in the gross product originating estimates (table 1.22, National Income and Product Accounts of the United States, 1961-1972²¹), into federal and state-local shares. These components were then each divided by 1961-1972 wages and salaries from all private industries²¹. The resulting Federal tax rates and state-local tax rates were added to obtain an average U.S. indirect business tax rate by year.

3. From the 1967 Census of Governments,²² indirect business taxes were calculated as total taxes minus income taxes. For the years 1962-1966, table 18 in the Census of Governments yielded U.S. and Alaska total taxes and income taxes, from which U.S. and Alaska indirect business taxes were calculated. The 1962-1966 U.S. measures of indirect business taxes were divided by wages and salaries from all private industries in those years²¹. The 1962-1966 Alaska measures of indirect business taxes were divided by total private Alaska wages and salaries⁹ (all industries less government) in those years. The Alaska results were divided by the U.S. result; this gave the Alaska indirect business tax rate relative to the U.S. indirect business tax rate.

4. For 1962-1966, the Alaska indirect business tax rates relative to the U.S. indirect business tax rates were multiplied by the state-local tax rates calculated in step (2) above. The resulting data were added to the 1962-1966 Federal tax rates from step (2); this yielded average Alaska indirect business tax rates. The 1962-1966 average Alaska indirect business tax rates were divided by the average U.S. tax rates. The results were adjustment factors for 1962-1966.

5. 1961-1972 data were collected on U.S. indirect business taxes⁸ and wages and salaries²¹ for each industry. Indirect business taxes were divided by wages and salaries to yield "industry tax rates" by year, by industry.

6. Adjustment factors were available annually for 1962-1966. For the other years, the adjustment factor was taken to be the average of the 1962-1966 adjustment factors. The appropriate adjustment factors were each multiplied by

industry tax rates by year, by industry. The results were the industry tax rates for Alaska.

7. The Alaska industry tax rates were multiplied by Alaska wages and salaries⁹ to obtain Alaska indirect business taxes by year, by industry.

Other Factor Payments

Other factor payments consist of capital consumption allowances, corporate profits, proprietors' income, net interest, and rental income of persons. Information on these items was not available for Alaska. However, U.S. data were available by industry for the relevant time period 1961-1972. Ratios of other factor payments to U.S. employee compensation⁸ were calculated for industry components in seven industrial sectors. These ratios were multiplied by Alaska employee compensation²³ by industry by year to obtain estimates of Alaska other factor payments. Gross product in each of these industry components was then calculated as the sum of employee compensation, indirect business taxes, and other factor payments. Other factor payments were treated as a residual in eight Alaska industrial components:

1. Metal mining
2. Oil and gas
3. Other mining
4. Contract construction
5. Food and kindred products
6. Lumber and wood products
7. Paper and allied products
8. Other manufacturing

Other factor payments were obtained for these industries by subtracting employee compensation and indirect business tax from gross product.

Alaska Price Deflators

Measurement of Alaska gross product in constant dollars requires use of a price deflation method. However, there are no direct Alaska price deflators available. U.S. implicit price deflators have been calculated for major industries, and these data aided in developing Alaska data.

For the years 1961-1972, implicit price deflators, employee compensation, and employment data were collected for twenty-one U.S. industries.²⁰ For each industry, total employee compensation was divided by numbers employed to

writing, rough estimates of the value of catch were used to estimate gross product in 1972.

Lumber and Wood Products: U.S.^{14,15} and Alaska^{16,17} data were collected from the 1963 and the 1967 census on value added by manufacture of lumber and wood products. U.S. gross product estimates were also obtained from the gross product originating series.⁸ For 1963 and 1967, U.S. value added estimates from the GPO series were divided by value added estimates from the U.S. census. The resulting ratios were multiplied by 1963 and 1967 value added estimates from the Alaska census. These two estimates were divided, respectively, by wages and salaries from 1963 and 1967 Alaska lumber and wood products.⁹ To obtain gross product estimates for 1961-1972, the resulting two ratios were averaged, and the average ratio was multiplied by wages and salaries from 1961-1972 Alaska lumber and wood products wages and salaries.⁹

Paper and Allied Products: Alaska census data on paper and allied products were unavailable due to disclosure regulations. U.S. census data^{14,15,18} for 1958, 1963, and 1967 were collected on value added and payrolls. U.S. gross product estimates were also collected from the gross product originating series⁸ for those years. Value added to payroll ratios were obtained for paper and allied products. The ratios for the three years were averaged. Ratios were obtained of (GPO) value added to (census) value added in U.S. paper and allied products. These three ratios were then averaged to obtain an adjustment factor to convert census estimates to national income concepts. The two sets of averaged ratios were multiplied. The resulting ratio was multiplied by Alaska paper and allied products, wages, and salaries⁹ from 1961-1972 to obtain gross product estimates for those years.

Other Manufacturing: "other manufacturing" in Alaska consists primarily of printing and publishing; chemicals; stone, clay, and glass products; machinery; and transportation equipment. Value added by manufacture for 1963 and 1967 was obtained from U.S. census data for the above four categories. U.S. gross product estimates⁸ for the same years were obtained from the gross product originating series. Adjustment factors were computed as the ratios of value added (from GPO) to value added (from census) for the four categories for 1963 and 1967. Data from the Alaska census^{16,17} on value added by manufacture and payroll for the four categories were obtained for 1963; data on printing and publishing only were available for 1967. The adjustment factors derived from U.S. census data were multiplied by the Alaska ratios to make the Alaska value added estimates

consistent with national income concepts. Ratios of adjusted value added to payroll were calculated for the four categories. The resulting ratios were used to compute 1963 and 1967 weighted averages, using Alaska wages and salaries⁹ in the four categories as weights. The resulting two weighted averages were averaged to produce a final estimate of the ratio of value added to payroll in "other manufacturing." This ratio was multiplied by 1961-1972 Alaska "other manufacturing" wages and salaries⁹ to obtain estimates of gross product for "other manufacturing" in Alaska.

Gross Product—Estimates of Factor Payments

In those industries where there was no direct information available concerning value added, the estimates of gross product were obtained by adding factor payments. Since value added in an industry is equal to the sum of all payments made to factors of production, factor payments were divided into three categories: employee compensation, indirect business taxes, and other factor payments. The sections below describe how each of these components was estimated. Employee compensation and indirect business taxes were estimated for all industries. However, other factor payments were directly estimated only for those industrial sectors not discussed above. In the industrial sectors that had gross product estimated directly, other factor payments were treated as a residual; they were equal to gross product minus employee compensation and indirect business taxes.

Employee Compensation

Employee compensation is equal to wages and salaries plus supplements. Data on employee compensation in Alaska were lacking, but Alaska wage and salary information was available¹⁹. This is feasible since supplements have a relatively fixed relationship to wages and salaries, the ratios of U.S. employee compensation to U.S. wages and salaries²⁰ for twenty-four U.S. industries were multiplied by Alaska wages and salaries for the same twenty-four industries over the period 1961-72. The resulting data were estimates of Alaska employee compensation by industry.

Accurate wage and salary information was lacking for agriculture, forestry, and fisheries, so it was impossible to develop separate estimates of employee compensation, fisheries, so it was impossible to develop separate estimates of employee compensation, indirect business tax, and other cost data in that industry. Also, in 1961 and 1962, employee compensation, indirect business tax, and other costs were only

obtain average annual employee compensation. Linear regression analysis was performed on each industry over the twelve-year period, with implicit price deflators as functions of average annual employee compensation. The resulting equations are shown in the tabulation below.

Alaska employee compensation data²³ on the comparable Alaska industries were developed for the 1961-1972 period. An exception was that only employee compensation for total services was available in 1961 and 1962. For those years, the "other services" equation was used to calculate a deflator for total services. Employment data⁹ were also collected by industry, by year. Total employee compensation was divided by the numbers employed to yield average annual compensation per employee. For each industry, Alaska average annual compensation per employee by year was substituted for X in the relevant regression equation. The regression equation was then used to compute Alaska price deflators, by year, for each industry.

In four industry categories: agriculture, forestry, and fisheries; metal mining; oil and gas; and air transportation the regression analysis produced unreliable results, so different procedures were used to obtain Alaska price deflators in those industries. The metal mining, oil and gas, and air transportation industries are subject to a considerable amount of price regulation. Also, in some cases, wages and salaries are a relatively small component of total value added. For these reasons, it is not too surprising that the regression analysis indicated a very weak relationship between average employee compensation and value added price deflators. Because prices tend to be determined on national markets or by national policies, the Alaska price deflators in metal mining, oil and gas, and air transportation were assumed to be the same as the U.S. price deflators.

The price deflator for agriculture, forestry, and fisheries was computed directly from data on the prices received by fishermen. It should be recalled that in Alaska, the

INDUSTRY - U.S.	REGRESSION EQUATION	r ²
Other Mining	$Y = 38.521 + .0060X$	.653
Contract Construction	$Y = -22.381 + .0215X$	.997
Food and Kindred Products	$Y = 83.065 + .0046X$	.804
Lumber and Wood Products	$Y = 55.396 + .0099X$	.904
Paper and Allied Products	$Y = 71.489 + .0041X$	.930
Other Manufacturing	$Y = 53.301 + .0086X$	.983
Trucking and Warehouse	$Y = 61.919 + .0064X$	.949
Water Transportation	$Y = 73.962 + .0061X$	.440
Other Transportation	$Y = -69.166 + .0392X$	.960
Communications	$Y = 98.122 + .0007X$	.312
Public Utilities	$Y = 88.754 + .0017X$	.726
Wholesale Trade	$Y = 58.422 + .0063X$	.941
Retail Trade	$Y = 30.661 + .0202X$	.947
Finance, Insurance and Real Estate	$Y = 35.758 + .0125X$	.968
Hotels, Motels, and Lodges	$Y = -5.408 + .0343X$	.948
Personal Services	$Y = 29.581 + .0224X$	.996
Business Services	$Y = 31.662 + .0153X$	.972
Medical Services	$Y = 40.135 + .0221X$	.984
Other Services	$Y = 34.718 + .0232X$	.996
Federal Government	$Y = 8.121 + .0198X$	.997
State and Local Government	$Y = -9.058 + .0277X$	.998

Y = implicit price deflator

X = average annual employee compensation

r² = squared multiple correlation coefficient

"agriculture, forestry, and fisheries" industry is composed almost entirely of commercial fishing. Using 1959 as a base year, since 1958 data were unavailable (the other implicit price deflators used 1958 as a base), the price per pound of salmon, halibut, king crab, and shrimp in that year was obtained.²⁴ These prices were multiplied by volume of catch in the years 1961-1972 for the four fish species. The results were summed for each year, yielding total value of catch of all four species by year in constant prices. Total value of catch of the four species was also obtained in current prices.³ Then, for each year, the total value of catch in current dollars was divided by the total value of catch in constant dollars. The result was the Alaska agriculture, forestry, and fisheries price deflator.

Alaska Gross Product in Constant Dollars

Alaska gross product in constant dollars is computed by dividing each current dollar gross product by the corresponding price deflator. This calculation was carried out for the individual industrial components; estimates for industrial

sectors were obtained by adding the figures for the relevant components.

Since gross product in constant dollars has been adjusted for changes in prices, it provides a measure of the change in real production activity. Current dollar gross product can increase due to a rise in prices even if real production remains constant. Constant dollar gross product will increase only if there is an increase in the output of goods and services in the Alaska economy. However, the nature of the deflation procedure is such that it is difficult to give a precise interpretation to the *level* of gross product in constant dollars. The constant dollar series is most useful as a measure of the *change* in output.

It should be noted that the price deflators use 1958 as the base year, but the implicit prices used are average U.S. prices, not Alaska prices. Thus, even in the base year, the price deflators for Alaska are greater than 100 since Alaska prices are higher than U.S. prices. In crude terms then, the constant dollar gross product series measures Alaska output valued at average U.S. 1958 prices.

NOTES

1. U.S. Department of Commerce, Bureau of Economic Analysis, Special printout sheets on Alaska personal income.
2. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Commercial Fisheries*.
3. Alaska Department of Economic Development, *Statistical Review 1972*.
4. U.S. Department of Commerce, Bureau of the Census, *1963 Census of Mineral Industries, Vol. I - Summary and Industry Statistics*.
5. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Mineral Industries, Vol. I - Summary and Industry Statistics*.
6. U.S. Department of Commerce, Bureau of the Census, *1963 Census of Mineral Industries, Vol. II - Area Statistics*.
7. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Mineral Industries Vol. II - Area Statistics*.
8. U.S. Department of Commerce, Bureau of Economic Analysis, Special printout sheets on product account data.
9. Alaska Department of Labor, *Statistical Quarterly*, various issues.
10. These breakdowns as well as the other breakdowns used in this report are in conformance with U.S. Bureau of the Budget, Department of Commerce, *Standard Classification Manual*, 1967 edition.
11. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Construction Industries, Vol. I - Industry Statistics and Special Reports*.
12. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Construction Industries, Vol. II - Area Statistics*.
13. U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, July 1971, p. 21.
14. U.S. Department of Commerce, Bureau of the Census, *1963 Census of Manufactures, Vol. I - Summary and Subject Statistics*.
15. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Manufactures, Vol. I - Summary and Subject Statistics*.
16. U.S. Department of Commerce, Bureau of the Census, *1963 Census of Manufactures, Vol. II - Area Statistics*.
17. U.S. Department of Commerce, Bureau of the Census, *1967 Census of Manufactures, Vol. II - Area Statistics*.
18. U.S. Department of Commerce, Bureau of the Census, *1958 Census of Manufactures, Vol. I - Summary and Subject Statistics*.
19. Alaska, Department of Labor, *Statistical Quarterly*, various issues. Wages and salaries for federal government—Alaska excluded military payrolls. Personal income for federal military - Alaska, 1961-1972, was added to obtain total Alaska Federal government wages and salaries. Personal income data from U.S. Department of Commerce, *Survey of Current Business*, (various issues).

NOTES (continued)

20. U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues, and special printout sheets on product account data.
21. U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues.
22. U.S. Department of Commerce, Bureau of the Census *1967 Census of Governments, Vol. VI, topical studies - Number 5, Historical Statistics on Governmental Finances and Employment*.
23. The ratios of U.S. employee compensation to U.S. wages were multiplied by Alaska wages to obtain Alaska employee compensation. U.S. data were obtained from U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, various issues, and special printout sheets on product account data. Alaska data were obtained from the Alaska Department of Labor, *Statistical Quarterly*, various issues. Data on wages for federal government in Alaska excluded military payrolls. Therefore, personal income estimates for military wages in Alaska were added to obtain total Alaska Federal government wages. Personal income data came from U.S. Department of Commerce, *Survey of Current Business*, various issues.
24. Alaska Department of Fish and Game, *Alaska Catch and Production*, various issues.

Gorouch

ISER
Contract

Alternate Forms

offer poss alt forms
relate to goals
he should say -
no public part
these are poss goals (AS)
& this is form.

no launching of attack ^{And}

① Assumptions

look at proposal
if diversification goal →
if cottage industry goal →
if regional economy →
if diversified & dispersed →

David →
Alvin
Swedish
experience

Will be here 333-2211

To L.A. expert

Date _____ Time 4:30 3:00

WHILE YOU WERE OUT

850

M Save questions

of _____

Phone Reservation for

TELEPHONED	J.	PLEASE CALL	
CALLED TO SEE YOU		WILL CALL AGAIN	
WANTS TO SEE YOU	1	other	

RETURNED YOUR CALL

Message

2 singles
Prof. Doscher 7:00

Tues nite.

Chamney

Operator

Specify Clark as project director
(or Bruce) ~~Smith~~.

Greg will talk w/ Univ people before
^{estimate}

Effect of investing - UNIV.

1. Use Admin existing model

2. Use Univ - MAP model - needs to be developed

-
- 1. Alternate Structures
 - 2. Loan programs
 - 3. Renewable resource pilot projects
 - 4. Revenue projection

Greg will get copy of proposal

What happen if you double rate of capital formation
in renew resource?

Worsening?

Evaluation of Alaska Inc.

Portion consumed - saved
mult effect where

ISER
contract

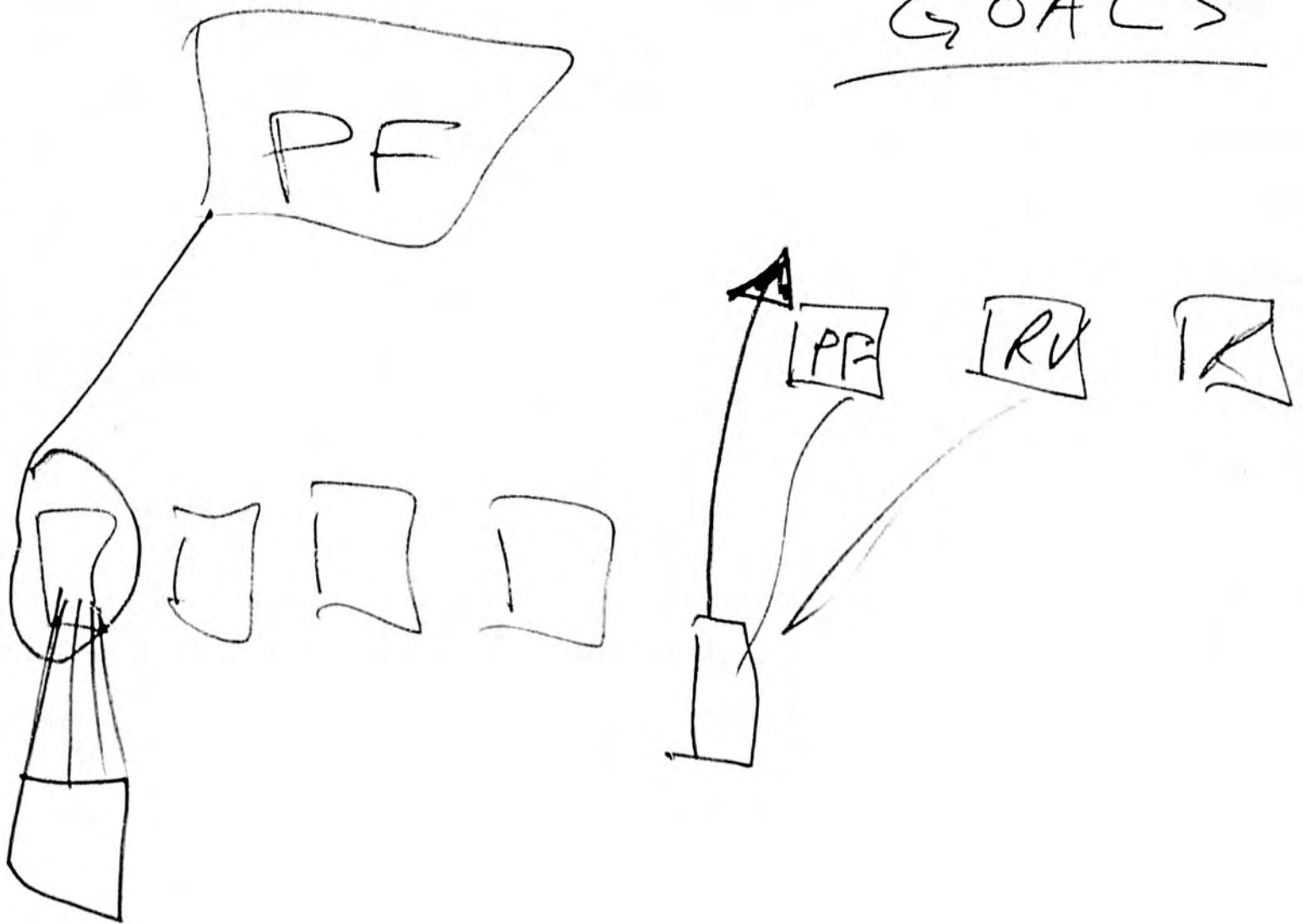
1 NRR run out

2 invest oppor run out

⇒ maximize income - high principle safety
income → feel as *nest egg*

investment return function

GOALS



GREGG ERICKSON

PJ - WGA
Bill Hall - NBft
Brad Tuck - LUP

156R

N Slope, etc

MEMO

concluded: Dept of Revenue is

We could estimate non petroleum

FY 78-79

but Revenue is good.

Petroleum (N slope) - substantial issue

Rev coming around

Beyond 79 - what do you want to analyze?

PRESENTED to Finance. 2 weeks intensive

\$140 M off. Now \$100 M off.

Independent estimate of all.

[Rev ok on other] ISER to provide estimates of non-petroleum (6-7 largest) -

ind / corp, pers, mv, l-gov, etc

At request - also proposed to analyze feedback on structural nature of economy & state revenues.

PENDING.

Long-range projections (Rev) show thru 1985.

2nd 1/2 of Univ proposal.

\$25,000 not

adequate for fundamental - impact

Contract w/ 156R - thru Greg.

rough draft to Greg.



REVIEW OF BUSINESS AND ECONOMIC CONDITIONS

UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH, June 1976, Vol. XIII, No. 2

AGRICULTURE IN ALASKA: 1976-2000 AD

INTRODUCTION

Sharply rising food prices and the possibility of food shortages have increasingly focused national attention on existing sources of food production and potential new areas of production in the United States. This subject is especially relevant to Alaskans who receive the largest part of their food supply by transport from the other states, and as a result pay some of the highest prices in the United States.

Just where Alaska fits into the picture as a food producer is yet undetermined. Clearly, agriculture in Alaska is small; however, it has potential for significant increases in production which could benefit Alaska, the rest of the United States, and the world.

To provide a clearer view of Alaska agriculture, its present capabilities and future possibilities, this issue of the *Review* looks at agricultural development in Alaska, analyzes past changes, and discusses future prospects for several types of agricultural production in Alaska.

Historical Development

Our knowledge of Alaska's agricultural past begins with some of the first Russian settlers who transported cattle and goats from Siberia to Kodiak Island in the latter part of the eighteenth century.^{1,2} These early settlers also grew such vegetables as potatoes, cabbages, radishes, and lettuce, although with limited success because of a wet climate.

After U.S. purchase of the territory in 1867, there was little agricultural activity beyond the food that the small white populace grew for their own tables. In fact, until the first territorial governor's report in 1884, U.S. officials had been led to believe through erroneous reports that the Alaska climate effectively ruled out agriculture. Such thinking changed during the next few years, however, and by the late 1890s, the U.S. Government had established agricultural experiment stations at Sitka, Kenai, and Kodiak to conduct research toward adapting certain grains, vegetables, fruits, and livestock to Alaska conditions.³

The gold discovery near Nome in 1900 brought thousands of prospective miners to that area, and this new market gave a boost to a fledgling experiment in Alaska animal husbandry—reindeer. Reindeer were first imported by the U.S. Government from Siberia in the early 1890s to be used as a subsistence resource for the Natives. But when the gold rush created the nearby market, Natives and others began to sell reindeer meat to the miners. After the gold rush population subsided, reindeer in Alaska continued to

¹ However, some researchers believe that southeastern Natives may have cultivated tobacco in aboriginal times. See F. Laguna, *Under Mount St. Elias: The History and Culture of the Yakutat Tlingits* (Washington, D.C.: Smithsonian Institution Press, 1972), p. 410.

² Alford Jake Barron, "History of Agriculture in Alaska" (Thesis, University of Oklahoma, 1939), Chapter 2.

³ *Ibid.*, Chapter 1.

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increase, being used both for local subsistence and commercially for local as well as import markets in the United States. Reindeer herds increased steadily until they peaked in 1932 at approximately 640,000 animals. After that, for a variety of economic and other reasons, their numbers were allowed to decrease precipitously. Total numbers in 1968 were estimated at only 30,000 head.⁴

The 1902 discovery of gold in the north Tanana Valley led to development there of a significant market for agricultural products. A small agricultural industry developed in response to the growing numbers of gold seekers, and local farmers produced grains, vegetables, livestock, and poultry products. However, as gold production diminished and the boom population decreased, agricultural activity also decreased.⁵

A depression-inspired experiment in the mid-1930s renewed agricultural interest in Alaska when the U.S. Government transplanted a group of impoverished farmers from the mid-western United States to the Matanuska Valley to develop agricultural production in that region.⁶ This experiment was a success to the extent that today, this valley produces the largest volume of agricultural products in the state.

During the late 1940s, the U.S. Department of

Agriculture (USDA), in response to U.S. military concern for the vulnerability of Alaska's food supply, increased its efforts to make the territory less dependent on the other states. The USDA increased its agricultural research, expanding ongoing programs and introducing new ones. In addition, the military increased its purchases of locally grown products. As a result, partly of this and partly because of a growing population, Alaska agriculture grew steadily from that time until the early 1960s. By the sixties, however, because of an improving transportation network between Alaska and the lower U.S., Alaska's small scale, inefficient agriculture simply could not compete with the massive, cheaper output of its lower U.S. counterpart. Thus, agriculture in Alaska stagnated during the 1960s (Table 1).

TABLE 1

Summary of Alaska Crop and Livestock
Sales 1960-1974

Year	Crops	Livestock	Total
1974	\$ 1,987,000	\$3,654,000	\$5,641,000
1973	1,980,000	3,318,000	5,298,000
1972	1,343,000	3,040,000	4,383,000
1971	963,000	2,871,000	3,834,000
1970	903,000	3,112,000	4,015,000
1969	624,000	2,948,000	3,572,000
1968	1,031,000	3,060,000	4,091,000
1967	920,000	3,197,000	4,117,000
1966	1,025,000	3,299,000	4,324,000
1965	989,000	3,255,000	4,244,000
1964	1,332,000	3,025,000	4,357,000
1963	865,000	3,148,000	4,013,000
1962	1,139,000	3,265,000	4,404,000
1961	1,090,000	3,315,000	4,405,000
1960	1,020,000	3,116,000	4,136,000

SOURCE: Alaska Crop and Livestock Reporting Service,
Palmer, Alaska

⁴ Dean F. Olson, *Alaska Reindeer Herdsmen*, Institute of Social, Economic and Government Research Report No. 18 (Fairbanks: University of Alaska, 1969), pp. 8-16.

⁵ Population in the area, including Fairbanks, grew to 10,541 persons by 1910. By 1920, however, declining gold production had caused the population to dwindle to 2,182. James W. Sullivan, "Fairbanks: An Economic Profile," *Alaska Review of Business and Economic Conditions*, 7 (January 1970):1.

⁶ Evangeline Atwood, *We Shall be Remembered* (Anchorage: Alaska Methodist Press, 1966).

Importance of Agriculture in Alaska

If large-scale agricultural development in Alaska were feasible, it could provide food products for a world market. In addition, it could provide employment and economic development for Alaskans. World population and incomes are rising, with a corresponding increase in demand for food. Greater food production is facilitated by increased

efficiency of production and development of new agricultural lands. There are only a few places left on earth with large areas of undeveloped land, and Alaska is one of these.

Another factor to consider in measuring the importance of Alaska agriculture is, even if it were only developed to provide for markets within the state, such development would provide employment opportunities and create secondary economic growth in rural areas. A developed, large-scale agriculture, if feasible, could provide Alaska consumers with a limited range of price-competitive food products. Another advantage would be the social benefits resulting from an attractive rural lifestyle enjoyed directly by farm families and vicariously by urban residents. There are, of course, some negative aspects to consider. The character of certain wild land areas would distinctly change. Development would affect habitat for wild game and fish to the extent that whole areas might become unsuitable for certain species. Stream and ground water pollution might increase due to use of agricultural chemicals and large concentrations of people.

Thus, we must ask several questions in considering agricultural development in Alaska:

- What is the present state of agriculture in Alaska? (What base have we to build on?)
- What, if any, types of future agricultural enterprises have been identified as feasible for Alaska?
- What is the potential for statewide and export markets?
- What would be the regional economic impact of such developments?
- What would be the social benefits of agricultural development; for example, the farm lifestyle?
- What would be the social costs of agricultural development—that is, pollution potential and impact on wild lands and wildlife.

The first four questions are explored in the remaining sections of this *Review*. Although the questions on social benefits and costs will need to be considered in depth, they are outside the scope of this article.

PRESENT SITUATION

Major agricultural production areas in Alaska are shown in Figure 1.

Livestock and Poultry Products

Milk Production. Milk is the largest component of reported agricultural sales in Alaska (Table 2).

TABLE 2

Sales of Alaska Livestock
and Crops, 1974

Product	Sales	Percent
Milk	\$2,449,000	43
Eggs	499,000	9
Potatoes	760,000	13
Hay	754,000	13
Beef	322,000	6
Lettuce	232,000	4
Reindeer ^b	150,000	3
Other Vegetables	129,000	2
Pork	77,000	1
Barley and Oats	104,000	2
Wool	98,000	2
Poultry Meat	10,000	— ^a
Silage	8,000	— ^a
Mutton	49,000	1
TOTAL	\$5,641,000	100

^aless than 1 percent

^bExcludes antlers, hides, and other byproducts (worth \$60,000 in 1974).

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

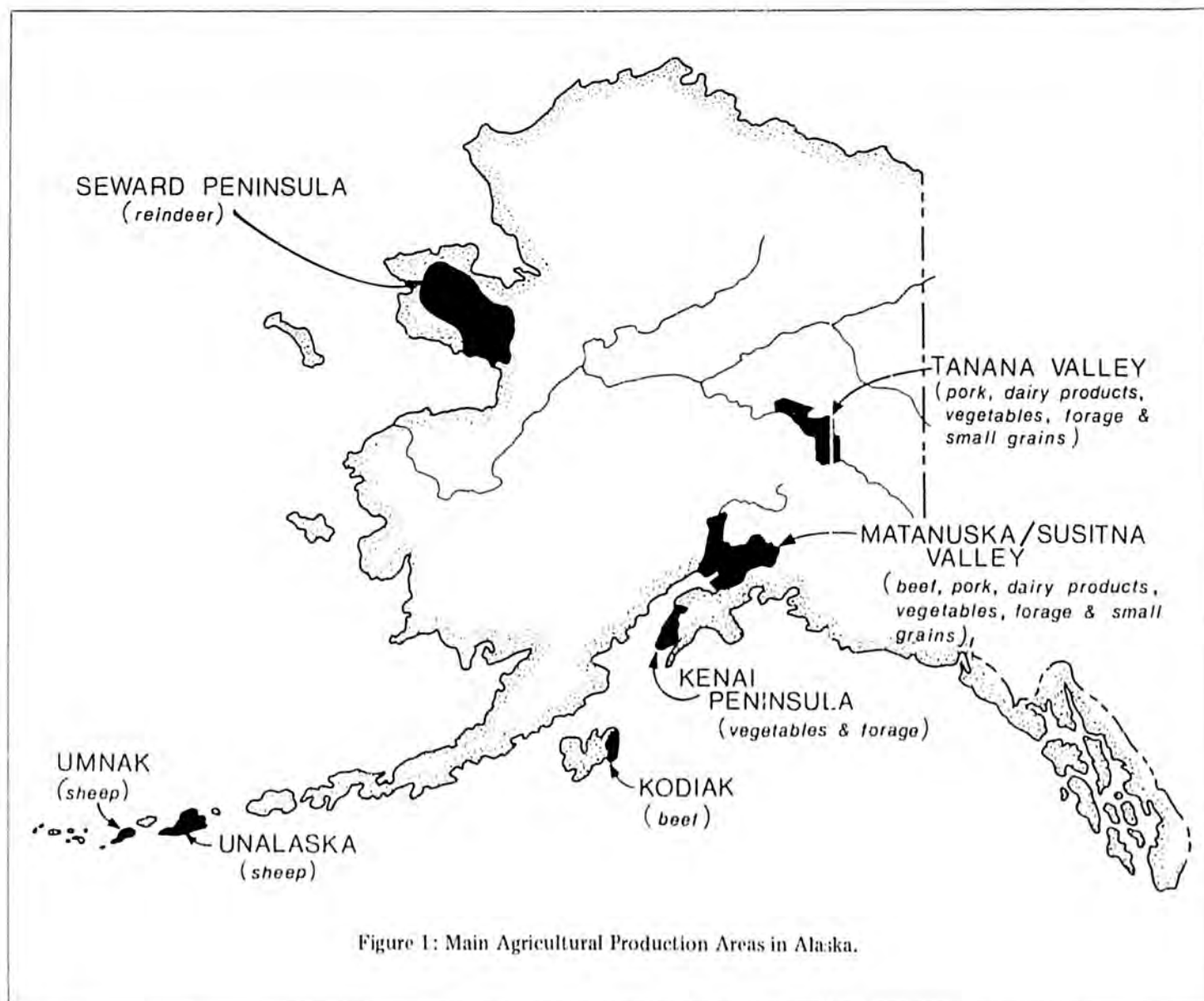
However, much of what is consumed in the state is imported.

According to 1972 data, fresh milk sales from Alaska producers accounted for approximately 33 percent of the total fluid milk consumed in Alaska.⁷ Another 33 percent (including all the fresh milk consumed in Southeastern Alaska) was shipped in fresh. Recombined milk accounted for the remaining 33 percent of the fluid milk market. It is shipped in as a dry powder and butterfat/cream, reconstituted in Alaska, packaged much like fresh milk and sold as a competing product.⁸

Alaska's dairy industry has been undergoing a readjustment period since the 1960s. Milk sales and production remained relatively constant in the Matanuska Valley for the entire period 1960-1974

⁷ Except for some ice cream items, all other dairy products, including fresh milk, are shipped into Alaska, largely from Washington State.

⁸ Wayne C. Thomas and Peter C. Lin, "Economic Factors in Alaska Milk Marketing," *Agroborealis*, 4 (1972):21-22. The milk data were taken from this article and updated.



(Table 3), while they declined rapidly in all other regions of the state. A number of factors were responsible for the reduction. The cost of milk production is relatively high in Alaska due to insufficient farm size, rising land costs, and economically more attractive alternative uses of labor and capital in the other sectors of the Alaska economy.

Beef Cattle. Cattle for slaughter come from two major sources in Alaska. One source is the Matanuska Valley dairy farms where bull calves and cull cows make up 31 percent of total beef marketings. The other source is ranches on Kodiak Island, which represents the largest beef breed production area, with 48 percent of beef sales.⁹ Most of the cattle slaughtered for beef in Alaska are marketed by the

individual producers and sold privately as beef for frozen food lockers. At times, a small percentage goes into manufactured beef where the carcasses are ground for hamburger and other processed meats. Some cuts of Alaska beef are intermittently sold at retail in mainland Alaska on a supply-available basis.

Alaska produces less than 2 percent of the beef marketed within the state.¹⁰ Total sales of Alaska beef in 1974 amounted to slightly less than 500,000 pounds (Table 4). As shown in Table 4, Alaska beef

⁹ Alaska Livestock and Crop Reporting Service, *Alaska Agricultural Statistics*, various issues.

¹⁰ Christopher Stephens, Wayne Thomas, and Virginia Burke, *Supplying Alaska's Red Meat and Poultry Markets*, Institute of Agricultural Sciences Bulletin 41 (Fairbanks: University of Alaska, May 1975), p. 23.

TABLE 3

Quantity Sold, Value of Sales, and Price Received
for Milk Produced in Alaska 1960-1974

Year	Tanana Valley		Matanuska Valley		Kenai Peninsula		Southeast		Totals		Price/cwt. ^b
	Quantity (lbs x 10 ³) ^a	Sales (x 10 ³)	Quantity (lbs x 10 ³)	Sales (x 10 ³)	Quantity (lbs x 10 ³)	Sales (x 10 ³)	Quantity (lbs x 10 ³)	Sales (x 10 ³)	Quantity (lbs x 10 ³)	Sales (x 10 ³)	
1974	645	\$ 92	16,555	\$2,357	—	\$—	—	\$—	17,200	\$2,449	\$14.24
1973	650	85	16,650	2,022	—	—	—	—	17,300	2,107	12.18
1972	800	135	16,100	1,828	—	—	—	—	16,900	1,963	11.62
1971	830	91	15,570	1,747	—	—	—	—	16,500	1,838	11.21
1970	950	141	16,850	1,853	—	—	—	—	17,800	1,994	11.20
1969	625	95	16,250	1,751	115	14	10	2	17,300	1,862	10.95
1968	470	65	16,400	1,726	120	14	10	2	17,000	1,807	10.63
1967	969	115	16,496	1,736	125	14	10	2	17,600	1,867	10.61
1966	1,700	168	16,430	1,684	120	21	50	8	18,300	1,881	10.28
1965	1,850	215	16,345	1,593	647	59	858	87	19,700	1,954	9.92
1964	1,520	184	18,280	1,720	640	60	1,060	103	21,500	2,067	9.61
1963	2,160	294	17,940	1,783	674	71	1,326	136	21,900	2,284	10.43
1962	2,420	323	17,760	1,817	460	51	1,360	149	22,000	2,340	10.64
1961	2,430	340	17,700	1,975	240	25	1,430	164	21,800	2,504	11.49
1960	2,170	308	15,504	1,763	221	25	1,505	181	19,400	2,277	11.74

^a10³ = 1,000^bcwt = hundredweight

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

TABLE 4

Quantity Sold, Value of Sales, and Price Received
for Various Meat Products Produced in Alaska
1960-1974

Year	Beef and Veal			Pork			Lamb and Mutton			Reindeer		
	Quantity Sold D.W. ^a (lbs x 10 ³) ^b	Sales (x 10 ³)	Price/ cwt D.W.	Quantity Sold D.W. (lbs x 10 ³)	Sales (x 10 ³)	Price/ cwt D.W.	Quantity Sold D.W. (lbs x 10 ³)	Sales (x 10 ³)	Price/ cwt D.W.	Quantity Sold D.W. (lbs x 10 ³)	Sales (x 10 ³)	Price/ cwt D.W.
1974	466	322	69.10	136	77	56.62	102	\$49	48.04	220	\$150	\$68.18
1973	420	309	73.57	110	71	64.55	20	9	45.00	261	144	55.17
1972	483	\$278	\$57.56	124	\$79	\$63.71	20	9	45.00	239	121	50.63
1971	494	273	55.26	138	88	63.77	21	10	47.61	365	188	51.51
1970	681	355	52.13	123	75	60.98	33	17	51.53	479	241	50.31
1969	719	359	49.93	142	64	45.07	17	9	52.94	442	219	47.82
1968	692	292	42.20	191	83	43.46	19	11	57.89	608	260	42.76
1967	857	350	40.84	140	64	45.71	28	12	42.86	517	188	36.36
1966	854	350	40.98	145	77	53.10	34	14	41.18	546	190	34.80
1965	694	279	40.20	198	98	45.96	21	9	42.86	522	200	38.31
1964	624	249	39.58	128	51	39.84	16	8	50.00	504	195	38.69
1963	505	209	41.39	64	24	37.50	15	8	53.33	394	138	35.03
1962	507	237	46.75	121	51	42.15	14	8	57.14	372	139	37.37
1961	251	116	46.22	166	67	40.36	13	7	53.84	364	136	37.36
1960	305	122	40.00	145	59	40.69	9	5	55.55	330	132	40.00

^aD.W. = Dress weight

^b10³ = 1,000

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

production for the period 1960-1974 has fallen from its highest production level in 1967. Part of reduced beef production in Alaska was due to unsettled Native land claims. Until land titles become less clouded, existing beef producers, especially those operating on leased federal lands, are probably reluctant to make the major capital investments necessary to maintain or increase production.

Hogs. In 1972, over 6,000,000 pounds of cured and uncured pork (42,000 carcasses) were shipped to Southcentral Alaska.¹¹ In the same year, less than 800 carcasses were produced in the state. Alaska pork, unlike Alaska beef, can move into any existing market, because it is similar in all respects to shipped-in pork products. However, local pork production can only expand significantly if the higher costs of production in Alaska are no greater than cost of pork in the lower 48 states plus transportation to Alaska. A 1971 study indicates that a production cost range of \$28.66 to \$36.25 per hundredweight (dressed weight) can be achieved in Alaska with good-to-average management.¹²

Since 1965, Alaska farm-level pork prices have not dropped below \$37.50 per hundredweight (dressed weight). Thus, increased pork production, if managed properly, should be profitable in Alaska.

Pork production through 1974 remained below that of 1965 (Table 4). In 1974, several pork producers in the Matanuska and Tanana valleys went out of business, both because of a lack of local feed and a lack of the processing facilities and other supporting services.

Sheep and Wool. Alaska sheep production occurs almost exclusively on the eastern portion of the Aleutian Islands. The production process is dissimilar to what is generally found in the western range areas of the lower states, because lamb production for meat is not the primary income generator. All lambs, both wethers and ewes, are kept for wool production. Only as the animals grow older and their wool production declines are they sold for mutton, generally to individual buyers (Table 4).

In 1974, a significant increase in mutton production occurred in the Aleutian Islands after a new slaughter house went into operation on Umnak Island. This mutton was sold to institutional buyers from the lower United States.

¹¹ *Ibid.*

¹² Wayne Burton, *Alaska Agriculture*, Institute of Social, Economic and Government Research Report No. 30 (Fairbanks: University of Alaska, 1971), p. 181. These cost figures have increased through 1975, as has the price for hogs.

The wool is also sold to markets in the lower states. Production of wool in Alaska has diminished in recent years, largely because of reduced national wool prices. In 1973 and 1974, the price received locally for wool increased fourfold over 1971 (Table 5), but production of wool in Alaska has continued to decline.

Eggs and Poultry. Egg markets in Alaska have fluctuated periodically since statehood. The current production level is greater than that of 1960, but less than that of 1965-1968 (Table 6). The farm price received for eggs showed little response to inflation; it was only seven cents per dozen higher in 1974 than in 1960.

Egg production is carried on by a few large operators. There are presently two commercial-size egg producers in Alaska and both are importing most of their feed. A locally developed feed base would reduce feed supply problems.

Poultry meat production in Alaska is primarily a byproduct of egg production, providing a means of getting rid of older birds.

Reindeer. By federal law, reindeer in Alaska are entirely owned and managed by Native herders. Most of the animals are located on the Seward Peninsula and Nunivak Island. Roundup and slaughter generally occur in the fall of the year. Most slaughter animals are marketed and consumed in Nome and in Native villages in northwest Alaska. Only a limited amount of reindeer meat on a supply available basis is marketed in Anchorage or Fairbanks. In addition, a small portion is shipped outside the state for use in the exotic meat trade.

The price received by reindeer herders has nearly doubled over that of the low year 1966, while production has fallen to its lowest level in the fifteen years of data reported in Table 4.

Herd management over vast areas in the arctic and subarctic north is difficult at best. Disease and predator problems along with range management and supply problems hinder herd management. The Native lifestyle, to a degree, prevents reindeer production from achieving market potentials.¹³ In addition, federal and state laws controlling methods of slaughter also hinder market growth in urban Alaska.

Crops

Hay and Silage. Hay and silage are forage crops produced to feed livestock. Dairy cows and horses

¹³ D. Olson, *Alaska Reindeer Herdsman*, Chapter 8.

TABLE 5

Production, Value of Sales, and Price Received
for Alaska Wool 1960-1974

Year	No. of Sheep Shorn	Wool Production (pounds)	Sales	Price per pound
1974	11,000	110,000	\$ 98,000	\$0.89
1973	11,000	129,000	115,000	0.89
1972	13,000	145,000	55,000	0.38
1971	16,000	225,000	43,000	0.19
1970	21,000	239,000	72,000	0.30
1969	23,000	269,000	94,000	0.35
1968	23,000	264,000	92,000	0.35
1967	21,000	246,000	98,000	0.40
1966	19,000	215,000	123,000	0.57
1965	18,000	209,000	111,000	0.53
1964	16,000	189,000	115,000	0.61
1963	14,000	167,000	97,000	0.58
1962	12,000	146,000	72,000	0.49
1961	12,000	128,000	51,000	0.40
1960	11,000	125,000	50,000	0.40

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

constitute the primary markets for Alaska hay. This crop is so important that milk production in the Matanuska Valley has to some degree fluctuated according to hay productivity. A reduction in milk production in 1971 can be partially explained by the smaller hay crop that year. In 1972, 1973, and 1974, the Matanuska Valley, in response to favorable climatic and economic conditions, produced the largest hay crops in its history.¹⁴

In 1974, hay produced in Alaska was worth approximately \$2,000,000. Of this, 39 percent or \$754,000 came from off-farm sales to Alaska horse owners (Table 7). Pleasure and work horses in Alaska in 1971 numbered nearly 3,000 head.¹⁵ Although data are not available, the number of horses would appear to be increasing in Alaska in conjunction with the population growth. If this is true, the demand by horse owners for roughage should continue to be strong, thereby increasing demand for hay.

The other important forage crop, silage, can be

¹⁴ However, Alaska milk sales did not follow the upward trend of hay production for the period 1972-74.

¹⁵ Alaska Agricultural Statistics, various issues.

TABLE 6

Production and Value of Sales for Alaska
Eggs and Poultry Meat 1960-1974

Year	Eggs Sold (dozen)	Sales (dozen)	Farm Price per dozen	Poultry Meat Sales
1974	525,000	\$ 499,000	\$0.95	\$10,000
1973	575,000	546,000	0.95	17,000
1972	576,000	518,000	0.90	17,000
1971	492,000	418,000	0.85	13,000
1970	408,000	341,000	0.84	17,000
1969	425,000	328,000	0.77	13,000
1968	617,000	496,000	0.80	19,000
1967	750,000	592,000	0.79	26,000
1966	842,000	648,000	0.77	16,000
1965	758,000	584,000	0.77	20,000
1964	408,000	328,000	0.80	14,000
1963	458,000	369,000	0.81	19,000
1962	493,000	400,000	0.81	18,000
1961	526,000	410,000	0.80	24,000
1960	518,000	454,000	0.88	17,000

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

produced from the same crop, grass or grain, as can hay. Determination of which harvest method to use depends on market, weather, crop, and storage conditions, as well as on feed and labor requirements of individual farms. In 1974, over 98 percent of the silage produced was used on the producing farms (Table 8).

Barley and Oats. Barley is used for cattle, hog, chicken, and horse feed. More barley was sold in 1973 than any year since 1960 (Table 9). However, in 1974, one large farming operation switched from barley to straw production (for pipeline construction), and the quantity of barley produced in the state decreased dramatically. This feed base instability has a detrimental effect on livestock production in Alaska.

Oats is the other feed grain grown commercially in Alaska. Oats production dropped from around 1,000 acres annually in the early 1960s to 500 acres in 1974 (Table 10). This crop is used for horse and dairy feed.

Potatoes. The Matanuska Valley accounts for 87 percent of the potatoes harvested in the state. The

remainder comes from the Tanana Valley, with a small portion also produced on the Kenai Peninsula. Potato production in Alaska is highly mechanized with hired labor needed only for harvesting. After harvest, potatoes can be stored by the producer until the next harvest period. This allows for a more continuous market supply and helps to prevent short-term market gluts which drive down the farm price.

Potato acreage fell to near its lowest level in 1974 (for period 1960-1974), while price received was more than double that of 1967 (Table 11).

Alaska-grown potatoes are commonly found in food stores throughout the state. However, a lack of potato-processing facilities in Alaska has limited the product to only the fresh market.

Several attempts, yet unsuccessful, have been made to develop frozen-food processing facilities in the Matanuska Valley. Until this occurs, both civilian and military markets will continue to look outside the state for frozen and dry-processed potatoes.

Vegetables

Lettuce. In 1974, lettuce had the largest dollar

TABLE 7

Production, Value of Sales, and Sale Price Received
for Alaska Hay 1960-1974

Year	Harvested Acres	Yield Per Acre (tons)	Quantity Produced (tons)	Production Value	Quantity Sold (tons)	Sales	Price per ton
1974	12,600	1.19	15,000	\$1,950,000	5,800	\$754,000	\$130.00
1973	11,600	1.28	14,800	1,332,000	4,400	396,000	90.00
1972	10,900	1.33	14,500	1,160,000	4,200	336,000	80.00
1971	7,000	1.03	7,200	576,000	1,500	120,000	80.00
1970	8,000	1.17	9,400	705,000	1,700	128,000	75.29
1969	8,100	.95	7,700	539,000	1,600	112,000	70.00
1968	7,900	1.25	9,900	545,000	2,200	121,000	55.00
1967	8,700	1.51	13,100	721,000	1,800	99,000	55.00
1966	8,200	1.38	11,300	655,000	3,200	186,000	58.12
1965	6,900	1.28	8,800	528,000	2,200	132,000	60.00
1964	8,300	1.30	10,800	626,000	1,800	104,000	57.78
1963	7,600	1.25	9,500	551,000	1,000	58,000	58.00
1962	7,800	1.37	10,700	674,000	3,200	202,000	63.12
1961	7,400	1.34	9,900	653,000	3,100	205,000	66.13
1960	6,900	1.52	10,500	772,000	1,300	96,000	73.85

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

TABLE 8
Production, Value of Sales, and Price Received
for Alaska Silage 1960-1974

Year	Harvested Acres	Yield Per Acre (tons)	Quantity Produced (tons)	Production Value	Quantity Sold (tons)	Sales	Price per ton
1974	2,800	4.46	12,500	\$500,000	200	\$8,000	\$40.00
1973	2,900	4.41	12,800	320,000	700	18,000	25.71
1972	3,800	5.08	19,300	367,000	500	10,000	20.00
1971	4,200	4.64	19,500	351,000	200	4,000	20.00
1970	2,900	4.69	13,600	245,000	800	14,000	17.50
1969	3,000	3.40	10,200	184,000	700	13,000	18.57
1968	3,500	5.26	18,400	276,000	400	6,000	15.00
1967	3,800	5.13	19,500	312,000	500	8,000	16.00
1966	3,900	4.69	18,300	329,000	200	4,000	20.00
1965	4,300	5.05	21,700	412,000	500	10,000	20.00
1964	5,600	5.21	29,200	540,000	1,500	28,000	18.67
1963	6,600	4.86	32,100	594,000	1,600	30,000	18.75
1962	6,500	4.03	26,200	498,000	900	17,000	18.89
1961	4,700	4.70	22,100	464,000	800	17,000	21.25
1960	4,400	4.59	20,200	411,000	80	1,600	20.00

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

TABLE 9
Production, Value of Sales, and Price Received
for Alaska Barley (produced for grain)
1960-1974

Year	Harvested Acres	Quantity Produced (cwt) ^a	Production Value	Quantity Sold (cwt)	Sales	Price/cwt.
1974	1,000	13,400	\$116,000	7,400	\$ 64,000	\$8.65
1973	3,100	48,400	363,000	39,700	298,000	7.51
1972	2,800	24,900	101,000	13,200	54,000	4.09
1971	3,100	21,600	83,000	6,300	24,000	3.81
1970	1,500	22,300	88,000	6,800	27,000	3.97
1969	1,200	14,400	53,000	4,500	16,000	3.56
1968	1,900	27,400	117,000	12,000	51,000	4.25
1967	1,800	36,300	144,000	16,000	63,000	3.94
1966	1,600	34,600	140,000	22,100	90,000	4.07
1965	1,600	32,300	131,000	14,800	60,000	4.05
1964	1,900	35,600	144,000	19,600	80,000	4.08
1963	2,200	31,700	135,000	18,000	77,000	4.28
1962	2,200	40,100	176,000	18,000	79,000	4.39
1961	2,000	35,000	172,000	21,400	105,000	4.91
1960	2,300	42,000	192,000	16,800	77,000	4.58

^acwt = hundredweight

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

TABLE 10
Production Value of Sales, and Price Received
for Alaska Oats (produced for grain)
1960-1974

Year	Harvested Acres	Quantity Produced (cwt) ^a	Production Value	Quantity Sold (cwt)	Sales	Price/cwt.
1974	500	5,900	\$50,000	4,700	\$40,000	\$8.51
1973	600	8,100	58,000	5,600	40,000	7.14
1972	500	4,800	21,000	3,400	15,000	4.41
1971	200	3,800	17,000	2,300	10,000	4.35
1970	500	7,200	29,000	2,500	10,000	4.00
1969	500	4,800	17,000	2,700	10,000	3.70
1968	900	15,000	68,000	10,000	46,000	4.60
1967	600	14,800	62,000	10,300	44,000	4.27
1966	400	10,200	42,000	6,800	28,000	4.12
1965	600	13,400	57,000	5,800	24,000	4.14
1964	500	12,000	53,000	6,600	29,000	4.39
1963	1,000	14,400	65,000	8,400	38,000	4.52
1962	1,100	21,500	97,000	7,900	36,000	4.56
1961	900	14,700	71,000	3,200	16,000	5.00
1960	1,400	25,500	120,000	8,400	39,000	4.64

^acwt = hundredweight

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

TABLE 11
Harvested Acres, Quantity Sold, Value of
Sales, and Price Received for Alaska
Potatoes 1960-1974

Year	Harvested Acres	Quantity Sold (cwt) ^a	Sales	Price/cwt
1974	570	72,400	\$760,000	\$10.50
1973	500	82,500	949,000	11.50
1972	550	69,300	658,000	9.49
1971	630	71,700	502,000	7.00
1970	610	72,800	480,000	6.59
1969	620	56,100	297,000	5.29
1968	620	94,400	538,000	5.70
1967	690	108,000	502,000	4.65
1966	710	93,700	520,000	5.55
1965	780	100,100	578,000	5.77
1964	730	120,000	889,000	7.41
1963	760	107,400	467,000	4.35
1962	730	120,000	576,000	4.80
1961	770	103,400	651,000	6.30
1960	730	96,000	614,000	6.40

^acwt = hundredweight

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

sales of any year since Alaska statehood. Lettuce acreage peaked in 1968 and has not since attained these levels (Table 12). A serious problem of perishability limits field production of lettuce for the Alaska market. Only one field crop of lettuce is possible during Alaska's short growing season. This is harvested between July and September, and the crop cannot be stored for any length of time. This means the market season is short and market glut problems are always a possibility.

Field Vegetable Crops. Field production of carrots, cabbage, radishes, celery, and broccoli amounted to 90 acres in 1974, a reduction of 115 acres from 1968 (Table 13). The decline has resulted from extensive labor and management problems and the high requirements for capital investment.

Controlled Environment Agriculture. Tomatoes and ornamentals are produced in Alaska on a limited basis. Production takes place in greenhouses on the Kenai Peninsula, in Southcentral Alaska, and in the Tanana Valley. Since these greenhouses can operate for longer periods (up to year-round), and the production process is faster than for field-grown varieties, crops can be marketed at different times during the year. Greenhouse production, as compared to field production, requires higher input costs and

TABLE 12

Harvested Acres, Quantity Sold, Value of Sales, and Price Received for Alaska Lettuce 1960-1974

Year	Harvested Acres	Quantity Sold (pounds)	Sales	Price/cwt. ^a
1974	65	860,000	\$232,000	\$26.98
1973	65	600,000	142,000	23.67
1972	60	580,000	143,000	24.66
1971	75	930,000	223,000	23.98
1970	60	770,000	157,000	20.39
1969	60	510,000	62,000	12.16
1968	80	910,000	115,000	12.64
1967	60	720,000	100,000	13.89
1966	60	600,000	93,000	15.50
1965	50	620,000	95,000	15.32
1964	50	690,000	95,000	13.77
1963	60	790,000	72,000	9.11
1962	50	780,000	111,000	14.23
1961	50	670,000	85,000	12.69
1960	50	610,000	77,000	12.62

^acwt = hundredweight

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska

results in increased production per square foot of growing space.

Controlled environment agricultural production can go beyond greenhouse production in that all the light is artificially supplied and greater control is exerted on the growth process.¹⁶ Experimentally, this method has shown substantially increased yields over greenhouse and field production.

Practical applications of controlled environment production are now being attempted in several locations around the world, including Alaska's Kenai Peninsula. Should the Alaska venture prove economically successful, the quantity and quality of local produce available to the Alaska consumer should increase markedly.

¹⁶ Donald Dinkel, et al., "Controlled Environment Agriculture," *Agroborialis* 5 (1973):6-8.

FEASIBILITY STUDIES

Regions

The basis for agricultural feasibility and development is land¹⁷ (see Appendix). In March 1974, a group of studies was published under the title of "Alaska's Agricultural Potential,"¹⁸ which included a report by the Soil Conservation Service, U.S. Department of Agriculture. This report stated that over 15,000,000 acres in Alaska were suitable for cultivated agricultural production (this figure has since been increased to over 17,000,000 acres). To achieve a better understanding of where these soils are located, an enclosed map (Figure 2) and Table 14 contain regional districts¹⁹ as recognized by the

¹⁷ Greenhouse and associated methods are excluded from this analysis, because these types of production do not require extensive quantities of land.

¹⁸ Alaska Rural Development Council, *Alaska's Agricultural Potential*, Publication No. 1 (1974), p. 19-20.

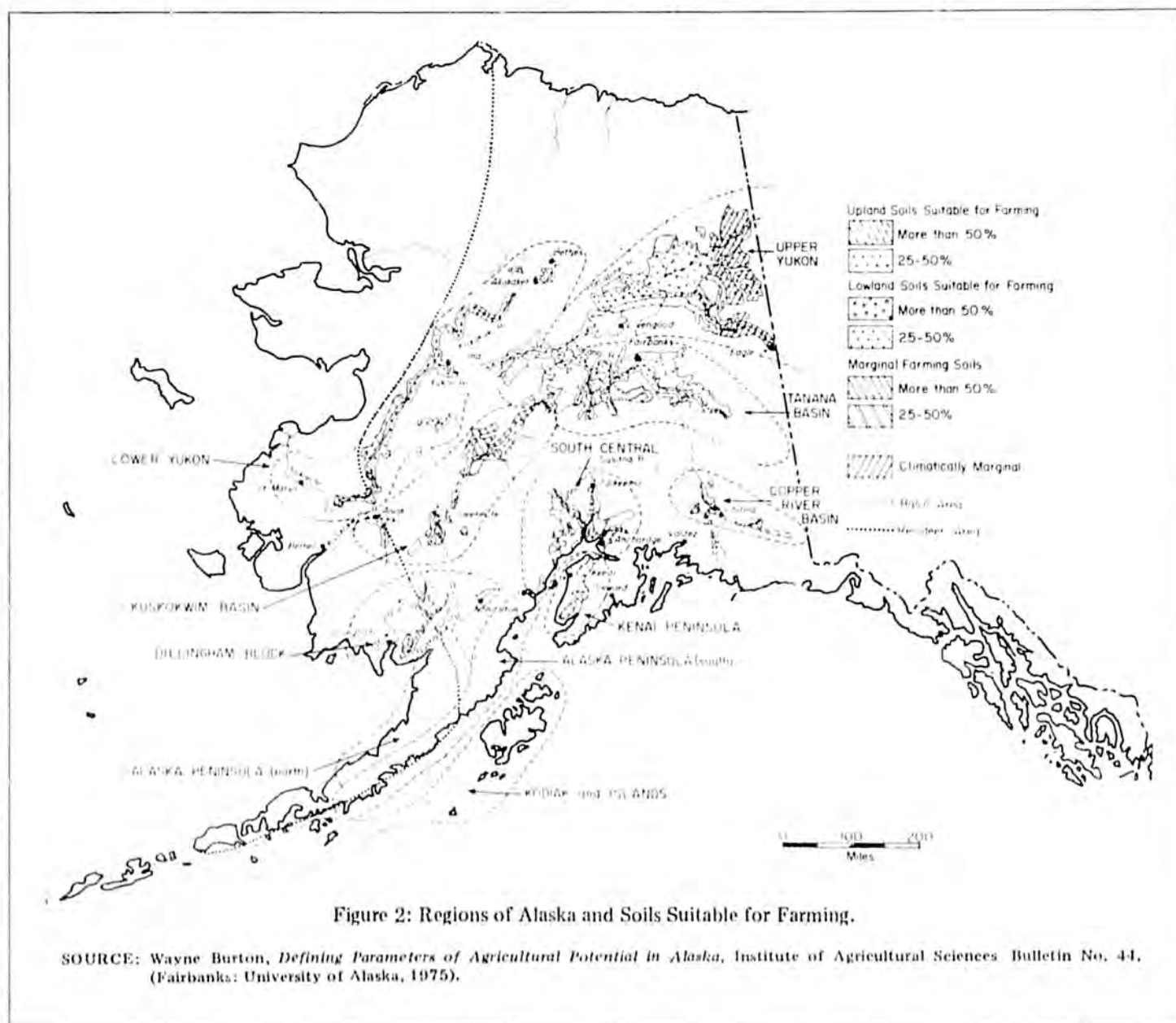
¹⁹ Wayne Burton, *Defining Parameters of Agricultural Potential in Alaska*, Institute of Agricultural Sciences Bulletin No. 44 (Fairbanks: University of Alaska, 1975), pp. 3 and 4.

TABLE 13

Harvested Acres and Value of Sales for Alaska Carrots, Cabbage, Radishes, Celery 1960-1974

Year	Harvested Acres	Sales
1974	90	\$129,000
1973	100	119,000
1972	110	127,000
1971	130	80,000
1970	140	87,000
1969	190	114,000
1968	205	154,000
1967	120	104,000
1966	95	104,000
1965	95	90,000
1964	105	107,000
1963	125	123,000
1962	105	118,000
1961	100	111,000
1960	130	115,000

SOURCE: Alaska Crop and Livestock Reporting Service, Palmer, Alaska



Federal-State Land-Use Planning Commission for Alaska.²⁰

Yukon Basin. The largest amount of the class 1 and 2 soils²¹ in Alaska are in the Upper Yukon Basin. These are mostly located in the Yukon Flats, a major water fowl nesting area.²² Prior to the

²⁰ Federal-State Land-Use Planning Commission for Alaska, *Resources of Alaska: A Regional Summary* (1975).

²¹ Soils are divided into group and capability class for agricultural use. Group A and B soils have properties that make them suitable for crop production. Group C tends to be more susceptible to drought, has greater erosion potential, and tends to have more slope problems. Soil capability classification (1 through 6) considers both properties and slope, which are related to soil damage during use.

²² FSLUP, *Resources of Alaska*, p. 283.

construction of the trans-Alaska Oil Pipeline, the Upper Yukon was one of the most isolated areas in the state. The human population was small, and year-round transportation was limited to air, although water transportation was available during the summer. The pipeline road, when (or if) opened, will provide the first year-round surface access to the region. As (if) a secondary road network develops in conjunction with the pipeline road, the region will become much more accessible, and movement of commodities into and out of the region will be enhanced.

Tanana Basin. The other major area with soils suitable for agriculture is the Tanana Basin. This region already has a developed transportation system

TABLE 14

Estimated Lands Available in Alaska for Agriculture (Thousands of Acres)

Region	Class 1 (Group A)	Class 2 (Group A)	Class 3 (Group B)	Class 4 (Group B)	Class 5 (Group C)	Class 6 (Group C)	Range	Total
Upper Yukon Basin	1,626	1,571	1,625	724	--	--	a	5,546
Lower Yukon Basin	--	233	--	1,372	75	232	a	1,912
Tanana Basin	311	1,915	--	610	480	--	a	3,316
South Central	1,247	--	--	116	--	409	1,134	2,907
Kenai Peninsula	545	--	--	--	--	237	210	992
Alaska Peninsula, S.	--	--	--	--	--	--	2,233	2,233
Dillingham Block	--	883	--	138	102	--	2,096	3,219
Alaska Peninsula, N.	--	--	--	--	345	674	1,163	2,182
Kuskokwim Basin	--	406	355	355	189	426	a	1,731
Copper River Basin	153	--	--	14	15	104	a	286
Kodiak and Islands	--	--	b	b	b	b	1,200	1,200
Reindeer Grazing Areas	--	--	--	--	--	--	100,000	100,000 ^c
TOTAL	3,882	5,008	1,980	3,329	1,206	2,082	108,036	125,524

^a No grazing lands were identified or included in calculations because of possible conflict with wildlife or other environmental factors.

^b Not available.

^c Estimates include only traditional reindeer grazing areas.

SOURCE: USDA-SCS field notes adjusted by Federal-State Land Use Planning Commission work group. This is Table 1 in Wayne Burton, *Defining Parameters of Agricultural Potential in Alaska*, Institute of Agricultural Sciences Bulletin No. 44, (Fairbanks: University of Alaska, 1975).

which includes all modes: air, water, rail, and road. One area near Nenana has also been identified as having good agricultural potential, but it is limited by lack of a secondary road system.

Grain and hay farms have recently been organized in the Delta-Clearwater area of the Tanana Basin, approximately 100 miles southeast of Fairbanks. A land base of sufficient size is also present to provide for further extensive development. This area already has a primary and secondary road system and is located near the Alaska Highway.

Other Areas. The South Central and Kenai Peninsula areas have good transportation networks and are easily accessible to the Anchorage market. These regions have significantly less cultivable lands than the Upper Yukon and Tanana valleys, but they enjoy locational advantages because of their

nearness to the population base of the state and tidewater ports. The remaining areas (Lower Yukon, Alaska Peninsula, Dillingham, Kuskokwim, Kodiak and the Aleutians) are either islands off the coast or are isolated from the road network of the state. These all contain lesser amounts of tillable agricultural lands, although significant livestock (including reindeer) range lands are present (Table 14).

Previous Studies

In 1969, average farm cost of production per acre was significantly higher in Alaska than it was in the other states (\$124.69 per acre compared with \$49).²³ Some of this difference results from the

²³ U.S. Department of Commerce, Bureau of the Census, *Census of Agriculture, 1969* (1972).

higher costs of doing business in Alaska, but a significant part is caused by individual farming operations that are too small to realize the economies of scale enjoyed by farmers in the other states. The reason for small operations here is that farm land in Alaska had its origin either in homesteading or other government programs, such as the Matanuska Valley colony program of the 1930s.²⁴ These programs tended to place small acreages (160 acres or less) in the hands of individual farmers.

According to a 1970 study²⁵ that cited 1967 statistics, average farm size for the Matanuska-Susitna region was only 79 acres. Farming operations were based largely on dairy enterprises. The report suggested that high production costs in the region were due in part to the small size of the farming operations and their resulting inefficiency. The report also developed budgets for dairy, grain, and potato enterprises and included both explicit costs of operations (such variable input expenses as labor, fertilizer, etc., and interest charges on loans) as well as implicit farm costs (such as payments to operator labor, management, and owner equity). The budget analysis of grade A dairy and grain farms showed that both explicit and implicit costs of operations were not covered until farm size approached 280 acres for dairy and 320 acres for grain. For potato farming, however, a land area of only 30 acres was needed to cover all costs of production.

Given this budget analysis (even though it is ten years old) and the continuing small sizes of Matanuska farms, it is not surprising that agricultural production and sales in that region have shown little change over the period 1967-74.²⁶

Agriculture in the Matanuska Valley has a significant advantage over other areas of the state, because it contains the most sophisticated market infrastructure. It has farm supply and service dealers, milk-processing facilities, a well-organized transportation system, and an easily accessible market. Its major drawbacks are the insufficient size of individual farms and highly speculative land values.

To gain a more complete view of agricultural potential in Alaska requires consideration of lands beyond the Matanuska-Susitna area. A 1967 study by

the U.S. Bureau of Reclamation²⁷ centered on livestock production. The results indicated only limited prospects for a finished beef industry on the Kenai Peninsula, Kodiak Island, and the Aleutian Islands.

The study considered an integrated system with feed produced in the region and with cattle produced both locally and shipped in. Budgets were constructed for (1) cow-calf operations on Kodiak and adjacent islands, (2) "stocker" cattle operations that primarily used cattle imported from outside the state, and (3) a cattle feed-lot finishing operation. In all cases (except for a slaughter house) revenues were insufficient to cover explicit and implicit costs of operations. An important aspect of this study was concentration on the USDA choice retail market in Anchorage which requires significant quantities of grain to bring cattle to finished weights. This tends to reduce the advantage of the large amounts of natural grass lands found in Alaska. A subsequent study indicated that a large market for grass-fed cattle (using only limited quantities of grain) is currently available for boned-out beef (over 10,000 carcasses per year) in the Anchorage-Fairbanks area.²⁸ Although no production feasibility analysis has been completed, such a study seems warranted. A corollary analysis would be necessary to consider the regional infrastructural components required in this type of red meat production.

In a 1968 study,²⁹ updated in 1971,³⁰ Burton examined the developmental problems associated with Alaska agriculture and surveyed state markets and types of crop and livestock enterprises. He viewed quite optimistically future marketing possibilities for pork, beef, reindeer, and milk production. However, he saw the expansion potential of potato, vegetable, and fruit production as more limited. Budgets using 1965-67 data indicated that revenue from hogs, dairy products, and potatoes could cover all explicit and implicit costs of production. Production costs were based on techniques and farm sizes prevalent at that time. Of

²⁴ U.S. Department of the Interior, Alaska Power Commission, *Development of New Lands in Matanuska-Susitna Borough* (February 1970).

²⁵ *Ibid.*

²⁶ *Alaska Agricultural Statistics*, various issues.

²⁷ U.S. Department of the Interior, Bureau of Reclamation, Alaska District Office, *Livestock Industry in Alaska* (January 1967). That portion of the U.S. Bureau of Reclamation that previously operated in Alaska is now called "The Alaska Power Commission."

²⁸ Stephens, et al., *Supplying Alaska's Red Meat and Poultry Markets*, p. 23.

²⁹ Wayne Burton, *Alaska's Agricultural Production Potential* (Ph.D. Dissertation, Montana State University, 1968).

³⁰ Wayne Burton, *Alaska's Agriculture, An Analysis of Development Problems*, Institute of Social, Economic and Government Research Report No. 30 (Fairbanks: University of Alaska, October 1971).

the budgets given, only that for beef production could not generate sufficient revenue to cover all costs. This, however, was not surprising since Burton used the budgets from the Bureau of Reclamation's Kenai Peninsula livestock study.

Burton (1971) identified a large farming venture in the Delta-Clearwater area as an example of large-scale agricultural development. The goal of this farming operation, as defined in 1970-71, was to develop an annual production of 6,000 acres of barley and 14,000 hogs. Actual development to date has been somewhat different than planned. Although information is difficult to obtain, this same Delta farm as of 1976 has developed approximately 4,000 acres and, depending on market conditions, raises barley, straw or hay. There is presently no hog production enterprise, due in part to insufficient market facilities. A primary bottleneck was lack of hog slaughter facilities near the farm. All things considered, however, this large-scale farming operation must be considered a success to the extent that the owners continue to operate the farm, borrow funds, employ people, and produce large quantities of crops.

A 1969 study by Olson reviewed and assessed the Alaska reindeer industry.³¹ The report states that Alaska Native owners of reindeer have only sporadically tapped markets beyond the traditional areas of production and consumption. In fact, because production is so tied to Native custom, Olson concludes that only non-Native management will bring about greater efficiency and increased production. He views this possibility with some dismay, because it may alter village life style. The advent of the Native corporations formed under the Alaska Native Land Claims Act may provide the stimulus for greater reindeer management efficiency by Native groups. From a marketing standpoint, significant markets, both locally and for export, exist with quite minimal input requirements (capital investments, labor, etc.) and production costs.

In 1972, the Tanana Valley irrigation study team completed the first in-depth agricultural study of a region other than the Matanuska-Susitna Valley.³² The study, which was sponsored by the Alaska Power Commission, included information on soils, climate, water, crop yields, and irrigation, as well as economic analyses of crop and livestock enterprises. The study team identified 272,000 acres as potential farm land

in the Delta-Clearwater, Wainwright-Eielson, and Totchaket regions of the Tanana Valley. It identified five types of potentially profitable farming operations: grain-hay, dairy, grain-hog, potato, and vegetable. The team then worked out projected budgets for grain-hay, grade-A dairy, and grain-hog farms at two levels of operation: 240 acres and 720 acres. It also worked out projected budgets for potato and vegetable farms of 40 and 120 acres. The study showed that a profit could result from all projected enterprises, with and without irrigation.

Yields, output prices, and input costs of this budget analysis were of 1970-71 vintage. Documentation in the report suggests that reasonable estimates were used. For example, higher labor costs were included because of the general difficulties in obtaining and retaining qualified labor in Alaska.

However, as with all previous studies mentioned, there are also problems with the Tanana Valley Irrigation Study. It emphasizes analysis of individual crop and livestock enterprises, but does not consider the aggregate situation. For example, the study does not consider the possibility of production increasing by 50,000 to 100,000 acres in Delta-Clearwater, and the resulting impact of increased competition among farmers both the input and output markets. How would attempts by more farmers to purchase these inputs or services affect price and availability of fertilizer, labor, land, or loanable funds? As a greater supply of feed grains or red meat enter the local market, how quickly would price deteriorate? What are the sensitive economic variables involved in producing food products in Alaska for export markets? The answers to these questions will identify the major problems which may retard the development of a greater market share from local farm sources. The implication is a severe one. Farm sector feasibility is limited by the markets and market infrastructure and vice versa. As of yet, no one has developed a regional economic analysis that predicts the interplay between these factors to determine how each influences the other.

The studies mentioned have all contributed to economic knowledge about agriculture in Alaska. However, none of them has addressed the significant issue of regional economic feasibility in considering both farm and market questions. A review of two feasibility studies^{33,34} shows the problem of limited

³¹ Olson, *Alaska Reindeer Herdsman*.

³² Tanana Valley Irrigation Study Team, *Irrigation Potentials-Tanana River Valley Alaska*, Supporting Report, (February 1972).

³³ Norman Whittlesey and Walter Butcher, *Irrigation Development Potential in Washington*, College of Agriculture Research Center Circular 579 (Pullman: Washington State University, February 1975).

³⁴ Washington State University, *Horse Heaven Hills Irrigation and Development Potential*, College of Agriculture Study Team Report (Pullman: 1970).

infrastructure and market potential for new agricultural development to be less pronounced in the lower states. Generally, in every other state in the United States, significant variety and quantities of farm inputs, such as fertilizers and herbicides, are available locally, as well as some type of large-scale agricultural processing facilities. In addition, all the other states have sizeable markets for their agricultural products. None of the above is true for Alaska. This means that projected budgets measuring farm feasibility may not be meaningful if local inputs, including labor, are not available, and if there are no transportation, processing facilities, or clearinghouse functions for marketing within the state (or within 1,000 miles) for the particular product involved. And finally, feasibility studies in other regions of the United States do not have to deal with a banking system that knows little about local agricultural production except that, based on past history, it is a highly speculative venture.

In concluding this section, it seems obvious that too little is known about the interplay between enterprise production and markets to determine if, and under what conditions, large-scale agriculture in Alaska would be feasible. Just because an Alaska crop has a high production potential in a biological sense does not mean that its production is economically feasible. Nothing has been estimated regarding the impact of large-scale agriculture on employment, population, and income in a regional sense. However, in many respects a good start has been made toward understanding farm feasibility.

MARKETS AND THEIR INFRASTRUCTURE

For the following market analyses, the author makes two assumptions: (1) no long-term market gluts will occur in red meat or feed grain world markets, and (2) land in large units will be available for agricultural production in Alaska.

State Markets

There is little to be gained by developing estimates of statewide food markets in 1976 when there are few local agricultural products to be supplied to those markets. Even if development of large-scale agriculture in Alaska were to begin now, it would take ten years to obtain significant increases in production. Because knowledge of large-scale farming in northern latitudes is incomplete and because the private sector and the government lack adequate knowledge to deal with the problems, an estimate of

twenty-five years seems more appropriate for obtaining significant increases in agricultural production.

Projecting statewide market size for the year 2000 (twenty-five years hence) requires estimating both state population and per capita consumption of agricultural products. Present consumption rates should provide some insight into the future. State per capita consumption or use-rate estimates are available for a few food products, such as red meat,^{35,36} but these figures are either limited to regions, or they include tourists and short-term workers. Another source of information is the U.S. Army Corps of Engineers port-to-port data,³⁷ which includes food shipped to Alaska but does not divide it into discernible categories. We will therefore assume that Alaska consumers have consumption patterns similar to those in the rest of the United States. As Alaska becomes more urbanized and is increasingly populated by immigrants from the other states, its consumption should increasingly approximate national patterns.

Table 15 presents Alaskan consumption and production estimates for crop and livestock products in the year 2000 at a projected population of 820,000. It would be unrealistic to assume that in twenty-five years Alaska will be producing enough food to meet local needs. Agriculture in the other states is tied to a large, sophisticated agri-business complex which processes, packages, and transports more agricultural products than anywhere else in the world. Alaska agriculture cannot compete in providing a wide range of fully-processed food products to Alaska consumers at competitive prices. In addition, even where Alaska products can compete, consumers in Alaska have acquired store and brand preferences that might well preclude them from purchasing home-grown products. All of these factors suggest that state production required to supply local markets will be significantly less than potential consumption. Table 15 shows that in the year 2000, only reindeer production will be greater than 50 percent of the projected state consumption.

To supply statewide markets would require more land than is currently in production. According to

³⁵ Wayne Thomas, Charles Marsh, and Christopher Stephens, *An Economic Analysis of Red Meat, Fish, Poultry, and Wild Game in Anchorage*, Institute of Agricultural Sciences Research Report 73-4 (Fairbanks: University of Alaska, March 1973), p. 4.

³⁶ Stephens, et al., *Supplying Alaska's Red Meat and Poultry Markets*, p. 9.

³⁷ U.S. Army, Corps of Engineers, *Waterborne Commerce*, 1974.

TABLE 15

Estimated Alaska Consumption and Production
For Agricultural Commodities in the Year 2000

Product	Alaska ^a Consumption	Alaska ^b Production
Beef (Mil Lbs. Dressed Weight)	95.5	11.5
Pork (Mil Lbs. Dressed Weight)	51.7	20.7
Lamb and Mutton (Mil Lbs. Dressed Weight)	0.8	.0
Reindeer (Mil Lbs. Dressed Weight)	0.8	2.6
Milk (Mil Lbs.)	200.0	100.0
Eggs (Mil Doz.)	13.4	6.7
Vegetables and Potatoes (Thousand Tons)	79.3	36.2
Fruit and Berries (Thousand Tons)	1.4	.7

^aSOURCE: Wayne Burton, *Defining Parameters of Agricultural Development Potential in Alaska*, Institute of Agricultural Science Bulletin No. 44 (Fairbanks: University of Alaska, 1975).

^bSOURCE: Author's estimates.

this scenario, new land development will occur in the Tanana Valley and on the Kenai Peninsula (Table 16). The Matanuska-Susitna Valley (Southcentral) will produce high-value field crops (potatoes and vegetables) and will continue to produce milk only in large, concentrated farming operations. A net reduction of approximately 3,000 acres of cultivated land (primarily forage and grain crops) will occur in this region. Acreage in potato and vegetable production, both here and in the Tanana Valley, should increase but be constrained by limited processing facilities. Agriculture in the Tanana Valley should develop in both the Delta-Clearwater area and in the Totchaket area near Nenana in the form of small grains (barley and oats), pork, egg, and milk production.

This scenario also has agricultural acreage increasing on the Kenai Peninsula in the form of greater production of feed and forage for cattle. Greater range use will occur on Kodiak Island for cattle and on coastal grazing areas for reindeer. Cattle will be sold to provide lean carcasses for a state "manufactured-beef" market.³⁸ Reindeer production will supply local markets north of the Yukon River

³⁸ Stephens, et al., *Supplying Alaska's Red Meat and Poultry Markets*, p. 22.

and be available at a retail level in more southern Alaskan communities.

Food prices will determine whether or not this projection of agricultural development will occur in the next twenty-five years. Should prices continue to

TABLE 16

Acreage Necessary for Estimated Alaska
Agricultural Production for the Year 2000

Commodity	South- Central	Tanana	Kenai	Kodiak	Reindeer Range
Beef					
Barley			5,000 ^b		
Hay/Silage			14,900 ^b		
Pasture			8,300		
Range				921,000	
Other			17,700		
Pork					
Barley		13,500			
Other		8,400			
Reindeer Range					20,000,000
Milk					
Barley	1,400 ^a	8,000			
Oats	1,000 ^a	3,300			
Hay/Silage	3,600 ^a	10,000			
Other	3,800	13,300			
Eggs					
Barley		2,900			
Other		1,800			
Vegetable-Fruit					
Crop	1,950	650			
Other	1,300	450			
Total Acreage	13,050	62,300	45,900	921,000	20,000,000

^a A total of 5,700 acres of barley, 2,200 acres of oats and 6,600 acres of hay/silage will be produced in Tanana Valley for Southcentral dairies.

^b A total of 3,400 acres of barley and 10,100 acres of hay/silage will be produced on the Kenai and shipped to Kodiak.

SOURCE: Adapted from Table 2 and W. Burton, *Defining Parameters of Agricultural Potential in Alaska*, Institute of Agricultural Sciences Bulletin No. 44 (Fairbanks: University of Alaska, 1975).

rise in the developed world (primarily the United States) near the rates of the past three years, agricultural development of new lands will become more feasible. Production costs must be considered, but these are heavily influenced by government policy. For example, interest on borrowed operating and investment capital can be fixed by law. State governments (Alaska included) can provide state-backed loans at low interest rates. Increased fertilizer production can be, in part, brought about by favorable federal and state decisions regarding location and development of natural gas fields and pipelines. Government-owned land in large acreages can be cleared and made available to private farmers at low cost. Price of fuel can be reduced by government edict and taxation policies. Government can support development of such infrastructural components as grain elevators and agricultural processing sites, and can improve transportation access either by low-cost loans or by direct purchase and development.

These governmental activities are possible in Alaska. The state agricultural revolving loan fund presently exists and provides low-cost loans to farms. Alaska statute AS 38.07.010, enacted in 1967, provides a state subsidy for land clearing. Increased development is occurring near the gas fields in the Cook Inlet area, and fertilizer production capacity is being increased. In addition, the development of the North Slope natural gas field and the resulting gas pipeline, should it be routed through Alaska, may allow fertilizer production in the Interior.

If agriculture develops as suggested in Table 16, it would create a significant input market for this sector of Alaska's economy. The size of this particular market depends on the quantity of crops and livestock produced. Because the base of any production is land, approximately 74,500 acres of cultivated land will be required to meet the projected market in the year 2000. To this must be added 63 percent more land to be used for farmsteads, roads, and agricultural processing areas, bringing the total required land to 121,000 acres, excluding reindeer and cattle range (Table 16). The land market would quickly develop if large tracts were sold to private individuals. The complexities of leasing versus selling state land, with or without covenants, is beyond the scope of this paper, but must be considered before such decisions are made.

In addition to the required land base, certain quantities of production inputs are necessary for operation of agricultural enterprises. An estimate by commodity of labor, diesel, gasoline, liquid petroleum (L-P) gas, and electricity consumption is

given in Table 17 by region. Fertilizer estimates by crop are given in Table 18.

How do these estimates compare with present Alaska agricultural requirements? In 1974, an average of 750 people were employed (full and part time) in Alaska agriculture.³⁹ The figure 1,054 given in Table 17 represents full-time jobs stated on an annual basis (for the year 2000). Since many of these can actually be accomplished by high school and college students and military people working part time, then the number employed, at least part time, will be greater than the 1,000 figure. No present cost estimates are available for farm diesel, gasoline, L-P gas, and electricity consumption; however, future use (year 2000) would be significantly greater than present use.

Fertilizer use in 1974 for Alaska approximated 3,517 tons.⁴⁰ By the year 2000, according to this scenario, the state total should be 16,460 tons—a 368-percent increase. Nitrogen-based fertilizer in 1974 accounted for approximately 52 percent of the total or about 1,828 tons. If one uses the same percentage for the year 2000, the present Kenai nitrogen fertilizer plant (Collier Carbon, Inc.) is already producing far more than the projected state requirements for the year 2000. Presently, and probably for the next twenty-five years, the non-nitrogen components of fertilizer will come into Alaska from external sources.

To farm 74,000 acres would require a capital investment in farm buildings and equipment significantly greater than presently exists in Alaska. Although precise data are not available, new investment costs of animal facilities, shop, shop equipment, farm equipment and farm storage would probably range between 50 million and 60 million dollars (1976 prices).

There is another aspect of statewide farm supply and service markets yet to be considered. Farm production requires numerous off-farm services. These include banks; equipment, feed, and fertilizer dealers; agricultural processing centers (grain elevators, animal and vegetable processing plants, etc.); and such general community businesses as construction firms and clothing stores. The amount of such related nonfarm economic activity will be determined by the amount of new land brought into production and the crop mix. Approximately 17,000 acres of cultivated agricultural land is presently in

³⁹ Alaska Crop and Livestock Reporting Service, *Alaska Agricultural Statistics*, various issues.

⁴⁰ Alaska Crop and Livestock Reporting Service, *Alaska Farm Reporter*, November 1974.

TABLE 17
Labor, Diesel, Gasoline, Liquid Petroleum Gas, and
Electricity Requirement for Estimated Alaska
Agricultural Production in the Year 2000

	Labor (Person-Years)	Diesel (Thousand Gallons)	Gas (Thousand Gallons)	L-P Gas (Thousand Gallons)	Electricity (MKH)
Southcentral					
Milk	242	66	99	33	.94
Vegetables & Fruit	41	17	26	9	.07
Tanana					
Pork	167	119	179	60	.65
Milk	98	60	91	30	.32
Vegetables & Fruit	14	6	9	3	.03
Eggs	161	26	38	13	.10
Grain ^a	28	63	94	31	.04
Hay/Silage ^a	24	53	80	27	.03
Kenai Peninsula					
Beef	112	341	513	184	.86
Kodiak					
Beef	54	b	b	b	b
Reindeer Range	60	b	b	b	b
Total	1,054	751	1,129	390	3.04

^a For transshipment out of region to Southcentral for milk production.

^b Not estimated.

SOURCE: Adapted from Table 3 and W. Burton, *Defining Parameters of Agricultural Potential in Alaska*, Bulletin 44, (Fairbanks: Institute of Agricultural Sciences, University of Alaska, August, 1975.)

TABLE 18
Alaskan Fertilizer Use by Type of Crop for
Estimated Alaskan Agricultural Production in Year 2000
(Tons x 1,000)

	Barley and Oats for Grain		Hay/Silage	Pasture	Vegetables and Fruit
Southcentral	.24	.94	0.0 ^a		1.65
Tanana	1.42	2.00	0.0 ^a		.55
Kenai Peninsula	.85	5.66	3.15		0.0
Total	2.51	8.60	3.15		2.20

^a Pasture use was quite small.

SOURCE: Adapted from Table 3 using coefficients derived from W. Burton, *Defining Parameters of Agricultural Development Potential in Alaska*, Bulletin 44, (Fairbanks: Institute of Agricultural Sciences, University of Alaska, August, 1975).

production.⁴¹ According to the scenario presented here, by the year 2000 there will be an additional 57,500 new acres. To assess the business development that may occur in conjunction with this new acreage, I used as a model a dry land farming area in central Washington.⁴² However, the crop mixes in the Tanana and Matanuska valleys and on the Kenai Peninsula are more complex than the dry land example used. Therefore, the following projections are probably underestimated.

A total of twenty businesses, sixteen caused by

⁴¹ Alaska Agricultural Statistics, various issues.

⁴² A.L. Walker, et al., *The Economic Significance of Columbia Basin Project Development*, Agricultural Experiment Station Bulletin 669 (Pullman: Washington State University, September 1966).

new land development,⁴³ would be associated with agricultural development (Table 19). These businesses would employ 142 people with total off-farm population comprising 554 people. The distribution of businesses and people would be in some relation to the amount of acreage in each region. In the Tanana Valley, the businesses might well be located in or near the major urban center, Fairbanks, instead of in Delta Junction or Nenana.

In conclusion, it would be appropriate to review the projections of crop land and agricultural enterprises that provide the basis for a projected 57,500-acre increase in agriculture to serve state markets. Agriculture in the Matanuska-Susitna Valley (Southcentral region) is expected to decline in

⁴³ The remaining four businesses are associated with agricultural land in production in 1976.

TABLE 19

Total Employment, Number of Businesses and
Population Generated by Agricultural Development
in Alaska for the year 2000

Type	Per 10,000 Acres	Per 74,500 Acres
Secondary Employment		
Processing and Marketing (No. of Workers)	1.1	8
Tertiary Employment		
General Business (No. of Workers)	13	97
Government (No. of Workers)	5	37
Total	19.1	142
Number of Businesses		
Contract Construction	.3	2
Manufacturing	.2	1
Transp., Communication, & Public Utilities	.1	1
Wholesale and Retail Trade	1.5	11
Finance and Real Estate	.2	1
Services	.5	4
Total	2.8	20
Population		
Off Farm	74	554

SOURCE: A. Walter, et al., *The Economic Significance of the Columbia Basin Irrigation Project Development*, Washington Agricultural Experiment Station Bulletin No. 669 (Pullman: Washington State University, 1966), and author's estimates.

acreage from the present level, but to increase in quantity of milk, vegetables, and potatoes produced. Much of the feed for milk production would be grown in the Tanana Valley and shipped and stored in the Matanuska Valley. Agriculture in the Tanana Valley would expand more rapidly in the Delta-Clearwater area, but the Nenana region would have the greatest percentage increase since it is starting at a zero production level. Pork and egg production would center in the Tanana Valley. However, agriculture will not be limited to supplying local markets. As noted in the next section, significant growth in Alaska agriculture will probably come from sales to export markets. In fact, development of agriculture for in-state markets will probably follow development of agriculture for export markets.

Export Markets

Alaska can grow a variety of cold weather crops. An obvious crop is barley, which is used as both a human and animal food in a number of countries of the world; a significant potential market for barley and other grains is Japan.

Tokyo, Japan is about as far from Anchorage as is New York. Japan is a country with a large population and limited land area. The amount of cultivated land in Japan has dropped from 8,129,000 hectares (20,087,000 acres) in 1960 to 5,752,000 hectares (14,213,000 acres) in 1974.⁴⁴ During the period 1960-1973, grain, potato, and bean production declined in Japan (Table 20). On the other hand, production of livestock products, primarily pork and poultry, increased significantly during the same period (Table 21). Also, per capita consumption of pork and poultry products increased five-fold between 1960 and 1973 (Table 22).

Increased consumption of meat and poultry can be viewed as shifts to the right in the demand curve for those products (Figure 3). This increase in quantity consumed has occurred in large measure because (a) the taste and preference function of the Japanese population is shifting toward a more Western diet (higher in red meat and poultry protein), and (b) real income levels in Japan are rising. These factors tend to indicate a continued strong market in Japan for red meat and feed grains.

Since domestic supplies of feed grains have been declining in Japan, the resulting difference between what is produced and what is needed to supply feed

⁴⁴ "Food Problem and Japan's Agriculture, Forestry and Fisheries," *Look Japan*, 10 November 1975, p. 6.

TABLE 20

Japanese Output of Principal
Farm Products, 1960-1973
(Tons x 1,000)

F.Y.	1960	1965	1970	1971	1972	1973
Grains	17,101	15,208	13,858	11,945	12,613	12,658
Rice	12,858	12,409	12,689	10,887	11,897	12,149
Wheat	1,531	1,287	474	440	284	202
Barley, Rye	2,301	1,234	573	502	324	216
Corn	113	75	33	25	23	17
Maize	2	1	--	--	--	--
Other Grains	296	202	89	90	85	17
Potatoes	9,871	9,011	6,175	5,312	5,598	5,030
Beans	919	646	505	417	510	451
Soybeans	418	230	126	122	127	118
Others	501	416	379	295	383	333
Vegetables	11,742	13,490	15,131	15,777	15,837	15,315
Fruits	3,307	4,025	5,454	5,351	6,420	6,501
Orange	1,034	1,331	2,552	2,489	3,568	3,389
Apple	907	1,132	1,021	1,007	959	963
Others	1,366	1,562	1,881	1,855	1,893	2,149
Crude Sugar	5	85	78	71	243	247

SOURCE: Japan Ministry of Agriculture and Forestry, "Food Consumption Statistics." This is Table 6 in *Look Japan*, Tokyo, Vol. 20, No. 235, November, 1975.

NOTE: Figures preceding fiscal 1971 do not include Okinawa Preference.

for the increasing livestock industry comes from import sources. The United States is a large supplier of feed grains, primarily corn and grain sorghum, to Japan. Other countries exporting feed grains to Japan include Australia, Thailand, Argentina, Canada and South Africa. In 1974, the United States supplied only 4 percent of the barley imported by Japan;⁴⁵ the total Japanese barley imports were 1,418,000 tons.⁴⁶ Barley imports are not presently controlled by the Japanese government and have a duty-free status.⁴⁷

During the twenty-five-year period to 2000 A.D. Japanese consumption patterns will probably tend toward higher per capita consumption of red meat and poultry. Likewise, Japanese production of barley (for human and animal use) may increase, but not in

⁴⁵ Bruce Greenshields, "U.S. Farm Exports to Japan May Rebound in 1975-76," *Foreign Agriculture* 13 (October 1975):4.

⁴⁶ "Food Problem and Japan Agriculture...", *Look Japan*, p. 21.

⁴⁷ Greenshields, "U.S. Farm Exports to Japan...", p. 3.

proportion to feed requirements. Given these assumptions, Japan should be importing at least 2,000,000 tons of barley by the year 2000.⁴⁸

There are three broad reasons why Alaska will probably not be able to capture a significant amount of this Japanese market:

1. To supply the entire Japanese import market for barley by 2000 A.D., would require that over 1,100,000 new acres of Alaska land be cleared, planted, and harvested, along with the corresponding development of a large agricultural infrastructure (this assumes a yield of seventy-five bushels per acre). The technical problems associated with such a large project over a twenty-five year period make it unlikely to occur.
2. Significant price competition might develop if the other suppliers of Japanese barley come to fear the loss of a major market.⁴⁹ An intense

⁴⁸ The Japanese government estimates that in 1985, domestic consumption will reach 2,500,000 tons and imports 1,600,000 tons. Japan Ministry of Agriculture and Forestry, *Long Term Prospect of Production and Demand for Agricultural Products in Japan* (August 1975), p. 3.

⁴⁹ This assumes the numbers of suppliers to be small, and each therefore would be able to assert some influence on price.

TABLE 21

Japanese Output of Livestock Products, 1960-1974

Actual Figures (1,000 Tons)							
Products	1960	1965	1970	1971	1972	1972	1974
Dairying	1,887	3,221	4,761	4,820	4,939	4,908	4,864
Meats	392	793	1,410	1,575	1,694	1,776	1,990
Beef	142	208	261	275	295	227	293
Pork	147	364	648	750	769	858	964
Poultry	75	204	490	540	622	685	729
Eggs	—	1,063	1,734	1,801	1,794	1,800	1,803

SOURCE: Japan Ministry of Agriculture and Forestry, *Milk and Dairy Products Statistics* and *Egg Distribution Statistics*, Ministry of Health and Welfare, *Sanitation Administration Duties Report*. Figures on Poultry obtained from Livestock Bureau, Ministry of Agriculture and Forestry. This is Table 8 in *Look Japan*, Tokyo, Vol. 20, No. 235, November, 1975, p. 6.

TABLE 22

Japanese Annual Per Capita Consumption
of Principal Foodstuffs, 1960-1973

	(In Kilograms)					
F.Y.	1960	1965	1970	1971	1972	1973
Grains	149.6	145.0	128.5	127.0	125.0	124.6
Rice	114.9	111.7	95.1	93.2	91.7	91.1
Wheat	25.8	29.0	30.8	31.0	30.9	31.0
Barley, Rye, etc.	8.9	4.3	2.6	2.8	2.4	2.5
Potatoes	30.5	21.4	16.2	16.5	16.6	16.2
Starch	5.5	8.3	8.1	7.8	8.0	7.9
Beans	10.2	9.4	9.8	10.0	9.8	9.8
Vegetables	99.7	109.6	115.6	119.5	117.8	112.4
Fruits	22.3	28.5	38.2	38.1	44.2	43.7
Meat (excluding Whale Meat)	3.4	6.7	11.5	13.3	14.2	16.2
Beef	1.1	1.4	2.0	2.3	2.4	2.3
Pork	1.1	2.7	4.7	5.1	5.6	6.4
Poultry	0.8	1.9	3.7	4.3	4.7	5.1
Others (Mutton, etc.)	0.4	0.7	1.1	1.6	1.5	1.4
Chicken eggs	6.3	11.6	14.8	14.9	14.6	14.5
Milk, Dairy Products	22.3	37.4	50.1	50.7	51.8	52.9
Sugary Foods	4.3	6.6	9.5	9.9	10.6	11.1
Marine Foods	27.8	29.2	31.8	33.3	33.3	34.3

SOURCE: Japan Ministry of Agriculture and Forestry, "Food Consumption Statistics." This is Table 2 in *Look Japan*, Tokyo, Vol. 20, No. 235, November, 1975.

NOTE: (1) Figures above relate to unadulterated foodstuffs. (2) Figures for fiscal 1972 include Okinawa Preference.

price competition and resultant market uncertainty would have greater impact on new land development in Alaska than on an existing land settlement in other regions of the world.

3. Japan would likely find it undesirable to break old trade arrangements and buy a majority of its barley from Alaska, given the spotty history of agriculture in the state and its limited experience (even twenty-five years hence) with large-scale barley production.

Considering these reasons, I assume that only a small portion of the Japanese market, less than 10 percent (or about 100,000 acres), will be easily accessible to Alaska grain producers by the year 2000. The Tanana Valley area near Delta Junction contains over 200,000 acres of land which could be used to grow barley. Large scale development for barley there would require at least one grain elevator for necessary drying and storage before shipment to a

tidewater port (probably Anchorage). Rail transportation would probably be the cheapest way of moving the grain to port. If a rail spur were constructed to Delta Junction, the elevator and the acreage would probably develop in that area.

A 1972 study analyzed the feasibility of growing grain and hay in the Delta-Clearwater area on several farms varying in size up to 720 acres.⁵⁰ Total farm

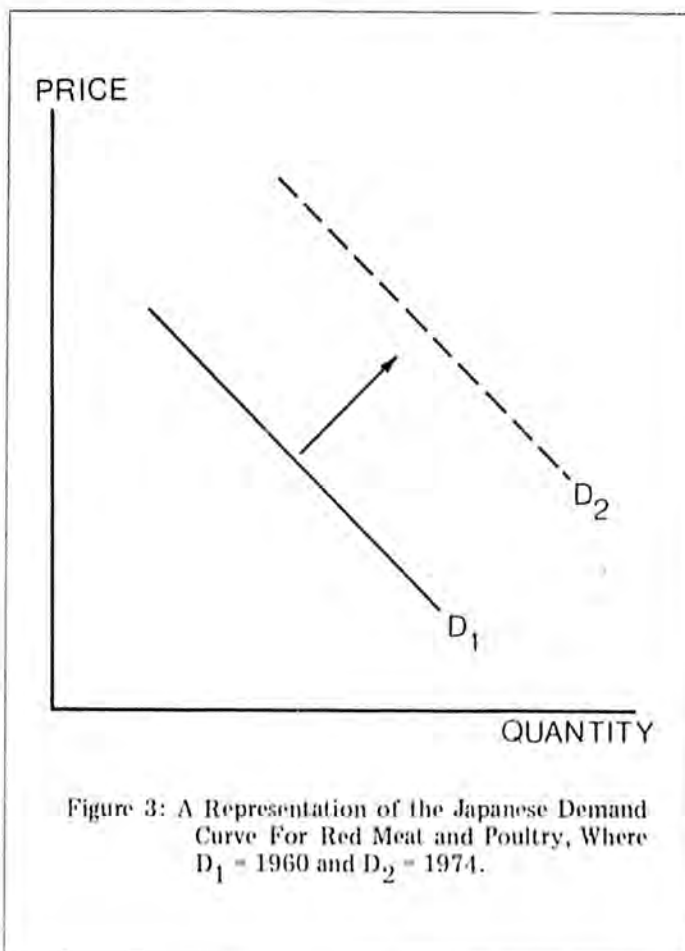


Figure 3: A Representation of the Japanese Demand Curve For Red Meat and Poultry, Where $D_1 = 1960$ and $D_2 = 1974$.

expenditures⁵¹ (fixed plus variable costs) for a 720-acre grain/hay operation was estimated at \$88.98 per acre assuming yields of 1.2 tons per acre. The variable expenses portion of this was broken out at \$54.23 per acre for this same farm.⁵² Revenue from sales to Japan would have generated \$76.49 per acre F.O.B. Japan in 1972.⁵³

The implication is that although revenue could

⁵⁰ *Tanana Valley Irrigation Study*, p. VI-20.

⁵¹ Based on 1971 data.

⁵² A transportation cost per ton from point of production to Japan is not included in these total or variable cost figures.

⁵³ *Look Japan*, p. 21. This assumes an average price of \$63.74 per ton F.O.B. Japan.

have covered variable expenses in a synthesized Delta-Clearwater grain/hay farm for barley production, it could not cover fixed expenditures. Thus, while the farm could operate over the short run, it could not replace plant and equipment over the long run and would cease to operate. However, the revenue picture changed significantly in 1973 and 1974. On a per acre basis (assuming 1.2 tons of barley production per acre), revenue would have increased to \$129.80 in 1973 and to \$202.26 in 1974, using average price F.O.B. Japan for imported barley.⁵⁴ Revised cost estimates are not available; however, we can safely assume that farm costs also increased, but the rate was probably significantly less than the rise in revenue per acre.

If world feed grain supplies increase more rapidly than world demand, Alaska may not be able to compete in world markets. If the opposite occurs and the grain price increases of 1973 and 1974 are not a short-term aberration but indicate an upward price trend, Alaska will probably become competitive.

To be more specific, achievement of an export market by the year 2000 would require a significant use of agricultural inputs and development of an agricultural infrastructure (Table 23). Grain production for export alone would increase the on-farm labor force by an estimated 150 full-time jobs⁵⁵ and fertilizer usage by 10,000 tons.⁵⁶ Estimated increases in diesel usage (over that shown in Table 17) would be 106 percent; gasoline, 106 percent; L-P gas, 90 percent; and electricity, 16 percent above requirements for state markets.⁵⁷

Using a major small-grain, dry-land production area in Washington⁵⁸ as a model for Tanana Valley development, 100,000⁵⁹ acres of new agricultural land would create 191 nonfarm jobs (agricultural processing, general business, and government). A total of twenty-eight businesses would be needed to support this farm production. The production of 174,500 acres of cropland in all three farming regions of the state would generate employment throughout

TABLE 23

Estimated Employment and Number of Businesses
Required to Serve Both Export and State
Agricultural Markets for the Year 2000

	Export	State	Total
Employees			
Agricultural Market and Processing	11	8	19
General Business Firms	130	97	227
Government	50	37	87
Total	191	142	333
Number of Businesses			
Contract Construction	3	2	5
Manufacturing	2	1	3
Transportation, Communication & Public Utilities	1	1	2
Wholesale and Retail Trade	15	11	26
Finance and Real Estate	2	1	3
Services	5	4	9
Total	28	20	48
Population			
On-Farm	585	4,111	4,696
Off-Farm	745	554	1,299
Total	1,330	4,665	5,995

SOURCE: A. Walter, et al., *The Economic Significance of the Columbia Basin Project Development*, Washington Agricultural Experiment Station Bulletin 689 (Pullman: Washington State University, Sept., 1966), and author's estimates.

the entire agricultural sector, including state and export markets. Total population of the state, attributable to agriculture and related off-farm employment, would total 6,000, with 1,300 of these associated with the export market.

The required farm capital investment in buildings and equipment to provide for the export market would be extensive. If the 100,000 acres comprised 50 individual farming operations, they would require approximately 100 tractors, 50 combines, several hundred farm implements, trucks, and small buildings. New investment costs for farm equipment, shop, shop equipment and farm storage for 50 farmsteads would total approximately 8 to 10 million dollars (1976 prices). A grain elevator would also be necessary, with an investment cost of around three million dollars (1976 prices), to provide sufficient

⁵⁴ *Look Japan*, p. 21.

⁵⁵ Calculated for 100,000 acres of production using coefficients from U.S. Department of Agriculture, *Agricultural Statistics* (1973), p. 449.

⁵⁶ Calculated for 100,000 acres of production using coefficients from W. Burton, *Defining Parameters of Agricultural Production in Alaska*, pp. 13 and 28.

⁵⁷ *Ibid.*, pp. 14-17, 28.

⁵⁸ Walker, et al., *Columbia Basin Project*, AES Bulletin 69.

⁵⁹ Depending on method of farming used, as much as 200,000 acres of land might have to be cleared to obtain a yearly average of 100,000 acres in production.

drying and storage capacity for both export and state markets.

The export market would also require development of specialized rail transportation to Anchorage and a grain-loading facility there. Since 100,000 acres could produce only 180,000 tons of export, an extensive port-loading facility would not be necessary. According to 1975 prices, an investment of approximately \$2.5 million would be required. The tonnage of grain would require eighteen ships of 10,000 dead-weight ton capacity (Liberty or Victory steamship types) to transport the grain to Japan. This type of ship is presently being operated by firms involved with the international grain trade.⁶⁰ This means that once Alaska grain reached a tidewater port such as Anchorage, the existing distribution system could handle transportation to Japan.

Japan should not be the only country considered for grain exports from Alaska. Numerous countries in Western Europe, as well as the Soviet Union, also import feed grain. The west coast area of the U.S. is also deficient in feed grain. I have emphasized the Japanese market for feed grains here because it is reasonably close; Alaska and Japan have had long-established trade ties, and Japan is looking for politically stable supply areas to provide food products for its home market.

From an Alaska viewpoint, the creation of an export feed grain base would stimulate development of a red-meat industry within the state. Large quantities of locally produced grain would reduce the difficulties of obtaining feed for animal rations. This would provide for the development of both small and large scale pork and beef enterprises. The state then would be able to supply a greater portion of Alaska's pork and beef consumption needs (Table 15) and possibly produce pork and beef for an export market.

SOME FINAL THOUGHTS

I have indicated no agricultural development for the Yukon Basin, Alaska Peninsula, Copper River Valley and Kuskokwim Basin. Development beyond small farms supplying local markets is possible in the next twenty-five years, but not expected. Little is known of the agricultural potential of these areas; many are remote from surface transportation systems; and land ownership at this time is unsettled. Having the potential for and achieving a large-scale agriculture are two different things. In the next

twenty-five years and beyond, only the possibility of a high return on investment, which would depend on food prices continuing to increase, will cause development in these areas.

What about the regions identified in this report—Kenai Peninsula, Kodiak, and the Tanana Valley? The amount of beef produced in Kenai and Kodiak should increase, because the state, through its Division of Agriculture and University of Alaska, is working on an expanded red meats and forage research and development program which should pay off by the next century. The industry will, for the first time, be receiving technical production support and, at the same time, facing an expanding manufactured (lean carcass) beef market.

The Tanana Valley has the most possibilities for agricultural development because of a large land base, a developed transportation system, and an embryonic agriculture. Land-use planning projects are underway in both Delta-Clearwater and Nenana, which when complete, will describe and promote use of new lands for agriculture. If the economic incentive is present, and positive state and federal land policies are put into effect, these lands will be developed.

The export market for grain is the base for large-scale development of agriculture. There are risks involved here, however. During soft market conditions, local producers in Alaska and elsewhere might be faced with world grain prices that are lower than cost of production. If a significant agriculture is to be developed in Alaska, the state may have to develop a support and subsidy program (in conjunction with Federal programs) to protect against weak market years. Agriculture in Alaska may not be able to sustain itself in the early period of major development (the next twenty-five years) without such state support. This type of policy decision must be much more fully explored before an intelligent decision can be made for or against state involvement.

Finally, other commodities besides barley and pork could be produced in Alaska and exported. Reindeer could easily move into the exotic meat trade and be shipped in small amounts to many markets throughout the world. Milk could be produced in the state, dehydrated, and shipped to export markets such as Japan. Another possibility is foreign export of beef and pork. One problem associated with foreign exportation of milk and red meat is the strict sanitation regulations placed on these products by foreign governments. Another problem is that markets are never certain because many foreign governments place quotas on red meat

⁶⁰ Letter from Kenneth Casavant, Associate Professor of Agricultural Economics, Washington State University, 1976.

and milk, and these vary by year. A major advantage of feed grains is that in countries like Japan, a quota system is currently not used, and the commodity has low perishability; therefore, minimum sanitation regulations are issued by the importing nation.

In conclusion, it should be observed that the estimated projections presented here are meaningless unless (1) a land base is made available to agriculture

and (2) world market forces provide an economic incentive for agricultural production in Alaska.

Wayne Thomas is an associate professor of economics with the Agricultural Experiment Station, University of Alaska, Fairbanks.

APPENDIX

PERCEPTIONS OF REALITY—ALASKA'S AGRICULTURE AND FOOD DISTRIBUTION SYSTEM*

In this section we set forth a number of our perceptions concerning Alaska's agriculture and its food distribution system. Readers of this report may disagree with a number of our perceptions, and in fact, some disagreement is expected. However, this disagreement can be helpful in focusing on those areas of inquiry where additional information is needed.

Our perceptions take either the form of statements of fact or issues that need an answer. They are presented in six major categories, with sufficient detail to attempt a clear, but concise, presentation.

Land

1. Land serves as a base for renewable and nonrenewable resource industries.

2. There will be competition between various renewable industries for the use of the land.

3. Land can be classified on a single-use basis or a multiple-use basis. A major question is which lands for which purposes?

4. Alaska currently has a scarcity of private land. Other than the Native lands, the amount of privately owned land comprises an area smaller than the District of Columbia. Agricultural development has been seriously hindered by this scarcity of land. Not only has there been little opportunity for agricultural expansion into large commercial farms, but land has been bid away from agricultural uses in favor of subdivision settlement or homesites.

5. There appears to be a relatively strong demand by individuals for homesites and recreational sites of 5 to 160 acres. This demand could most likely be satisfied from land other than large blocks of potential agricultural land. Land that has good potential for commercial agriculture could be primarily reserved for agricultural use.

6. Large quantities of land suitable for cereal grain and forage production are located in the Interior along major rivers. The exact acreage is somewhat indeterminant, but it amounts to millions of acres. (The Soil Conservation Service estimate is 17 million acres of agricultural land in Alaska.)

7. Native corporations control sizeable quantities of potential agricultural land. At some point in time, these corporations may choose to develop these lands for agricultural production or enter into an arrangement to have the lands developed. The decision processes would be more internalized than that of the state.

The Development Process

1. Agriculture was the basic industry in the early development of the lower 48 states. Industrialization came later as agriculture moved through the nation, especially the

West. In Alaska, agriculture never developed into a sufficiently large or pervasive enough industry to be called basic. Because Alaska can now be considered somewhat industrialized, agriculture would have to be added to the industrial base rather than vice versa. One would not expect agricultural development in Alaska to follow the general pattern experienced by most of the lower 48 states.

2. There is no large, strong political and economic power base for agriculture. There appears to be little opposition to agriculture *per se*. Thus there appears to be a more or less indifferent attitude toward agriculture. Opposition would be expected to occur when and if conflicts between the uses of land arise and agriculture is a contender.

3. The perceptions that most individuals have concerning the potential of agricultural development in Alaska is negative. This perception would need to be changed if agriculture is to succeed in Alaska.

4. Agricultural development policy is interrelated with general economic development, e.g., growth policy, settlement policy, land and other resource policy.

5. The 40- to 160-acre homestead type of farming operation has not led to significant agricultural development. It is not likely to lead to significant development in the future. There may be some exceptions for very intensive crop production.

6. Alaska contains large land areas, so the creation of large commercial farms is possible at the start of the development process. The situation is more comparable to the development of large farms on the west side of California's San Joaquin Valley than the smaller farm units in the Columbia Basin Project of Washington State.

7. If expansion of agricultural output in Alaska takes place, it will not come from the expansion of the current system. Not only would the type of farming likely be different, but the farm operators would be expected to primarily come from the lower 48 states or from nonfarm employment in Alaska.

8. Agricultural development occurs in a process of stages or steps. A strong and dependable grain and forage economy is the first step to a strong livestock economy. Thus, one would expect the grain and forage to be produced internally or be imported. For Alaska the latter does not appear to be economically feasible on a large scale. Vegetable production

*From a report prepared by J. Edwin Faris and R. J. Hildreth for the Joint Federal-State Land-Use Planning Commission for Alaska in cooperation with the Agricultural Experiment Station, School of Agriculture and Land Resources Management, University of Alaska.

on a large scale requires a rather sophisticated infrastructure. Such an infrastructure is most difficult to create from scratch.

9. Many people see a dilemma in agricultural development: Which comes first, the land reservation or the proof of success? Agricultural lands need to be available before agricultural development can take place. But it may be necessary to demonstrate that agricultural production is economically viable before lands could or would be set aside for agriculture.

Agricultural Output

1. Alaska, as compared to the lower 48 states, has unique climate conditions. This uniqueness makes it extremely unlikely that agricultural production practices would be directly transferable from the lower 48. At the minimum, adaptive research would be needed to make production technology applicable to Alaska's conditions. Systems of producing, storing, and marketing agricultural commodities would apt to differ from those in the lower 48 states. This is consistent with differences among these states; e.g., irrigation in the West and lower grain yields in the Southeast than in the Midwest.

2. The current and future state, national, and international needs for agricultural output will greatly influence the need for agricultural development.

3. The development of an agricultural industry in Alaska could lead to increases in gross state product and gross national product over time.

4. Limited data prevent performing a rigorous estimate of costs and benefits of a potential agricultural industry. First, there is really very little comparable agriculture in Alaska at the current time. Second, public and private costs of the necessary infrastructure are not known. Third, the social costs and benefits need to be estimated.

5. There are a number of specialty crops, such as seed crops, where Alaska has a unique advantage over other production areas.

6. Very satisfactory yields of barley and oats have been attained on the type of agricultural soils found in interior Alaska. Yields of wheats tested recently are less certain. This land might need to be irrigated in some areas or summer fallowed in others to obtain satisfactory and dependable yields. It appears that the rivers could serve a most important role in the transportation network.

7. Heat losses from pipeline pumping stations or other industrial endeavors may in some cases be useful to agricultural production or processing. A controlled environment greenhouse production unit could probably be developed using the heat losses to produce such crops as vegetables, flowers, and house plants. The heat might also be used to help power a pelletization plant for agricultural forages.

8. The recreational horse population is a most serious competitor for the limited amount of hay and grain produced in Alaska. This drives up the cost of hay and grain which makes it less profitable to produce milk and red meat animals. With a strong grain economy in Alaska, this distortion would not occur.

9. Agricultural research, although limited, indicates that

the production potential is great. One way to determine if it would also be economically profitable is to promote agricultural development in an area based on the large, efficient-size farm concept.

Agricultural Infrastructure

1. Significant development of the agricultural potential in Alaska would absolutely require major public and private investments in the infrastructure. Without attempting to determine which investments are public and which are private (or perhaps both), some major infrastructure investments would need to be made in (a) water-based transportation facilities; (b) roads; (c) education; (d) agricultural research and extension; (e) storage, drying, and processing facilities; and (f) input supply firms such as those supplying fertilizer and insecticides.

2. It is possible that Alaska's farmers could have a competitive advantage in obtaining certain fertilizers and other petrochemicals in the future relative to a number of farming areas in the lower 48 states. This is contingent upon more of the petroleum being processed in Alaska.

3. Transportation rates may tend to work adversely against agriculture. The rates have been based on low volumes or historical patterns. With larger volumes and competitive pressures, the rate structures should change and become more favorable toward agricultural production and marketing. This includes both rail and water freight rates.

4. The South and Kenai Peninsula areas have a reasonably adequate transportation network to the Anchorage market. These lands have potential for vegetable production on a small scale until a better infrastructure is developed. Grazing of cattle also could increase, with increased slaughter capacity and marketing channels.

5. A large portion of Alaska's population is in, or adjacent to, urban centers. The well-developed food distribution system serves a large majority of the state's population. The food chain infrastructure is based on a food-import economy.

The Environment

1. The side effects of various types of agricultural enterprises and organizations upon the environment need to be given attention.

2. If agriculture were to develop on a very large scale, it would undoubtedly affect the Native culture and style of living in some areas. Some adjustments could be made to minimize these effects. Opposition to the development of agriculture in these areas may materialize.

3. There would be environmental effects resulting from agricultural production. The type and magnitude of these effects as now seen appear to be based more on value judgements than on analytical data. For example, a conflict may not exist between the use of land for agricultural purposes and for certain wildlife habitat. In fact, agricultural production could increase the number of some types of birds and decrease others or perhaps decrease the number of large fur-bearing animals.

This report was partially funded by the Joint Federal-State Land-Use Planning Commission for Alaska.

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MEMORANDUM

TO: Clark Gruening, Chairman, House Special Committee on the Alaska Permanent Fund

FROM: The Institute of Social and Economic Research

SUBJECT: Alternative Approaches to Calculating Contributions to the Permanent Fund

November 18, 1977

Introduction: As part of ISER's contract with the committee to analyze the economic impacts of alternative investments and policies of the Permanent Fund, ISER is also to address the issue of how the legislature might go about determining the level of contributions to be made to the Permanent Fund beyond those constitutionally mandated.

As previous analyses of investments and expenditures using ISER's econometric models have already suggested, the determination of an appropriate pattern of state expenditures involves considerations far broader in scope than simply the provision of public services to satisfy the demands of a stationary population. Because state government plays a central role in determining the overall level of economic activity in the state, via direct employment and expenditures in other sectors of the Alaska economy, savings/expenditure choices confronting the Alaska Legislature are most appropriately considered within the context of the impact of alternative choices on the growth of employment, population and incomes in the state and on the ability of the state to sustain such growth in the long run. These considerations are of particular importance given that much of any expenditure growth is to be financed from revenues derived from depletable resources.

Two alternative approaches might be suggested in approaching the savings/expenditure choice. At the one extreme, one might adopt simple savings formulas, or rules, to minimize policy discretion over expenditure choices. At the other extreme, one might adopt a fully discretionary expenditure policy in which decisions on savings and expenditures are based solely on considerations of current economic conditions. Neither extreme is likely to be wholly adequate in serving both the goal of satisfying local demands for services by the existing state population and the long run growth goals of the state.

In order to satisfy the demands of the local population for public services, some simple formula approach might be deemed appropriate. However, to take into account the growth effects of state policy, some more elaborate, and more flexible, formulations would be required. This memo is intended to present some preliminary, simple formula approaches, as well as the limitations of such approaches. It also discusses the types of considerations which are relevant to the development of appropriate expenditure rules and which adequately capture the growth effects of any state savings/expenditure choice.

The following memorandum identifies these important variables and discusses how they are related to one another. These relationships can become quite complex and, when expressed in mathematical terms, confusing to the non-economist. For the purposes of this paper, we have attempted to minimize the use of professional jargon and mathematics and have focused on the basic principles of a formula approach.

Background: There are a variety of possible formulas to govern contributions of state revenues to the Permanent Fund. The simplest is, of course, a fixed percentage of state petroleum leasing revenues. Such a formula would build up the balance in the Permanent Fund at a relatively predictable rate, but it would ignore current as well as future state budget needs. A constant percent contribution, for example, could leave large balances accumulating in the general fund over the next several years; but it could also, within a decade, begin to cause substantial general fund deficits in succeeding years.

Another formula, although more complicated, could be constructed with the objective of stipulating that Permanent Fund earnings provide a specified percentage of state revenues by a certain date. If, for example, the goal of the Permanent Fund was to provide 25 percent of the state's revenue needs in perpetuity by the year 2000, the purpose of the formula would be to determine the annual contributions to the Permanent Fund required to accomplish this goal.

A third and similarly complex alternative formula could be devised with the objective of providing for a smooth, orderly growth of money available in the general fund in order to meet the operating needs of state government for the longest possible period. And a fourth alternative formula could conceivably be designed whose purpose was "counter-cyclical," that is, encouraging reduced general fund spending in boom times and increased spending during recessions in the state's economy.

Revenues contributed to the Permanent Fund under any kind of formula are kept outside the normal budgetary process in that they are not available for normal state expenditures. Thus, it follows that the larger the contributions to the Permanent Fund in any year, the less general fund revenues available for expenditures and vice versa. To the extent that the legislature limits each year's appropriation to the revenues available that year to the general fund, the Permanent Fund contribution becomes the key policy variable controlling spending from the general fund. Indeed, because state spending is a major factor in the state economy, Permanent Fund contributions must also be viewed a key policy variable affecting the state's economic growth and population.

An Illustrative Formula: Although ISER is now modeling the impact of such alternative formulas on the state budget and the Alaskan economy, for the purpose of illustrating the use of such formulas, the present memo concentrates on the third type of formula, that is, one which would allow a smooth and orderly growth of general fund spending by putting all revenues in excess of the projected current needs of state government into the Permanent Fund.

A smooth, orderly growth of state expenditures is one which reflects the normal growth of demand by Alaskan residents for the services of state government, the income transfers, such as payments under the public assistance program, and the expenditures of local government, to the extent these later two are supported by general fund expenditures. In absolute dollar terms, this demand for state expenditures will tend to grow in response to three factors: 1) growth of the Alaska population; 2) inflation; and, 3) growth of real income per capita.

Any formula governing Permanent Fund contributions which is intended to allow a smooth and orderly growth in the money available in the general fund will have to reflect these three factors as well as unanticipated new ones such as a significant disaster. If contributions to the Permanent Fund allow general fund surpluses to grow, the legislature will come under pressure to spend them. Conversely, if the formula does not leave money in the general fund sufficient to keep up with the demand in state services, the legislature will soon be compelled to "break" the formula.

It is not difficult in principle to come up with a formula to estimate the money needed in the general fund in a given fiscal year. One plausible formula for a target rate of growth in state spending would be one which formulates that the rate of growth of state expenditures (rEX) will be equal to the rate of growth in the population (rPOP) plus the rate of growth in prices (rPRICE) plus the rate of growth of personal income per capita (rYPC). Expressed mathematically, the formula would be the following:

$$rEX = rPOP + rPRICE + rYPC$$

According to the formula, a 5 percent increase in state population or a 5 percent increase in the price level or a 5 percent increase in real personal income would each require a 5 percent increase in general fund appropriations if the existing quantity and quality of state services were to be maintained. Correspondingly, if all three variables increased 5 percent, general fund appropriations would have to be increased 15 percent to provide commensurate services.

Experience over many years in other states indicates that citizens are not satisfied with a constant quantity and quality of state services. Rather, as time passed and real incomes increased, citizens expected more and better services from state government and demanded higher levels of real spending per capita. In other words, the demand for state services rose disproportionate to rise in real per capita income. This disproportionate demand for services as incomes rise is captured by the concept of the "income elasticity of demand" for state spending and can be mathematically expressed by the symbol e .¹ Modifying the above formula to allow for the "income elasticity of demand," it becomes: $rEX = RPOP + rPRICE + rYPC(e)$.

¹The income elasticity of demand is defined as the percentage rise in demand for services per one percent rise in real per capita income.

Thus, if the "income elasticity of demand" is estimated to be 1.2, a 5 percent rise in real personal income would result in a 6 percent increase in state spending per capita. ISER is presently investigating state expenditure data from other states in an effort to determine a reasonable income elasticity value for Alaska and will incorporate the value in its quantitative analyses.

None of the three factors determining the target rate of state spending does, in fact, move at a constant rate from year to year, and a target based on average growth rate established in previous years is likely to be "too high" in some years and "too low" in others. This need not be fatal, however, because the impact of population growth, inflation and higher citizen expectations tend to determine state expenditure patterns only over the long run and with some lag in any case. The kind of formula suggested here is, moreover, self-correcting to a large extent because any base expenditure figure selected ($EX(t-2)$) and the three commensurate growth rates can and would be continually updated as more recent information becomes available.

Conceivably, the legislature could find that the target figures are consistently too high or too low for several years running and that a persistent deficit or surplus was being built up in the general fund. For this reason, legislation establishing a formula might provide for redetermination of parameter e in the formula at periodic intervals--for example, every five years.

The preceding formulas establish only the target expenditures for each fiscal year. They do not by themselves establish the amount of the fiscal year surplus or deficit or the proportion of the surplus to be deposited in the Permanent Fund. To determine the size of the current fiscal year's surplus or deficit, we need to know what total state revenues will be, for both petroleum and non-petroleum sources. If the Permanent Fund contribution is to be determined in advance of the legislative budgeting process, it will be necessary to establish a definitive projection of state revenue and subtract from that projection the expenditure target for state spending. This approach adds another potential source of error to calculation (the revenue projection) and increases the risk that the formula approach would not in fact limit current spending sufficiently or, alternatively, would create irresistible pressures upon the legislature to "break" a formula they felt was intolerably restrictive.

A more workable approach might be to provide that all revenues, except the constitutionally mandated 25 percent of non-recurring mineral revenues that must be contributed to the Permanent Fund, accrue to the general fund up to the point at which general fund revenues equal fiscal year spending target. Once that level has been reached, all revenues from whatever source would be contributed to the Permanent Fund or to a contingent general fund reserve which could be called upon when a given year's target expenditures exceed the revenue remaining in the general fund after the mandatory contributions to the Permanent Fund and the other contingent

liabilities have been made. Under this approach, the legislature would not know in advance exactly how much money would be available in the general fund nor how much the Permanent Fund would be enhanced during the year. In its deliberations on the budget, both of these items would have to be estimated, and miscalculation for unforeseen developments would result in unexpected general fund deficits or surpluses which would carry over to later years. But, of course, that is exactly the situation that exists today.

Using a formula approach to Permanent Fund contributions, we would expect these contributions to be considerably more than half of petroleum revenues the state will receive over the next few years. Absent major new oil and gas discoveries on the state land or very large increases in real energy prices, the proportion to be contributed to the Permanent Fund could be expected to fall to a level below 25 percent by the mid-1990s. Eventually, the objective in maintaining smooth, orderly growth of monies available in the general fund would require withdrawals of accumulated earnings and ultimately of capital from the Permanent Fund. At some time in the future, therefore, the formula approach would no longer be viable, but the original concept of the Permanent Fund and its constitutional basis would have to be revised at that point in any case and this legal issue would likely be one of the least of Alaska's problems. The approach described here would be likely to postpone that day for the longest feasible time.

While the above illustration of a formula might create a "regularity" in the growth of state expenditures, it also serves to illustrate two serious limitations of a simple formula approach. First, such a formula fails to account for the long run viability of the chosen policy in the face of a depletable resource, and second, the formula might produce undesirable policy consequences should the economy enter a downturn. For example, the failure to consider the stabilization aspects of state expenditure policy by using such a formula would lead to declines in state expenditures at precisely the times when increases might be justified to offset the downward cyclical effect of, say, declines in pipeline construction.

Because of these limitations, it is essential that alternative formulas or rules be tested in policy simulations designed to anticipate the consequences of alternative rule specifications on both the short and long term growth of the Alaska economy. The ISER econometric model is designed to accommodate such alternative specifications and to test them.

ISER is completing several applications of the formula and will have the results available for the committee's review at its next meeting. As structured, both formula and the data sets related thereto are computerized and can be easily restructured to analyze the effect of policy choices the committee may wish to examine, such as allowing a 5 percent increase in state spending net of the formula's computation.

Professor Scott Goldsmith is the principal architect of the computer model and has served as the principal liaison with the committee. He is interested and willing to continue working with the committee in its efforts to assess the impacts of varying contributions to the Permanent Fund and of the Fund's investment options.

LG/m

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Alaska State Legislature

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THE ALASKA PERMANENT FUND

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REP. RICK URION

House of Representatives

TO: The Honorable Clark Gruening August 22, 1977
Chairman
House Special Committee on the Permanent Fund

FROM: Mike Doogan
Committee Administrative Assistant

RE: Proposed Committee Contract with ISER (attached)

The following are changes I recommend after discussions with Jim Edenso, Jim Rhode, Gregg Erickson, and Lee Gorsuch.

That either: Clause I (A) be dropped from the contract

Clause I (A) (1) be amended to read: The Contractor shall review the investment of that part of the 1970 general fund balance placed with Alaska banks with the purpose of determining the policies which guided that investment and the extent to which those policies were directed at influencing the rate and direction of growth in the Alaska economy or sectors thereof.

The amendment is recommended because all concerned agree that there is insufficient data to trace any money other than that placed with the banks, the loan money and capital expenditures voted by the legislature being virtually untracable.

Dropping the clause is recommended because simply studying the \$118 million placed with Alaska banks does not tell us anything, unless we need the information in considering whether the investment portion of the fund in HB 300 be placed through local banks.

That Clause (B) and Clause (C) be switched.

My reading of the contract makes the work in the current Clause (C) necessary before the work in the current Clause (B) is done.

That the rearranged Clause (B)--the current Clause (C)--be amended to include a formula for contribution, such as the one you have been considering.

JP

August 22, 1977

Jim Rhode points out, and I agree, that the formula would make all revenue (not just the revenue called for in the constitutional amendment) subject to contribution to the Permanent Fund after, of course, the budget rate of growth had been set.

That the rearranged Clause (C)--the current Clause (B)--be amended to include inflation as a (4) and the current (4)--any other regional economic indicators that the Contractor may consider relevant--be made (5).

*no
can
do* That (this is at the end of the current Clause (B)) a (4) be added measuring the effects of the earnings being used in both hard and soft loan programs in the state. This might also be accomplished by changing the wording in (1).

These additions are considered necessary to plan for all possible contingencies.

*already
there* That Clause (D) be amended to read: For each of the projects, the Contractor will trace the impacts of the investment in terms of gross and net changes in employment levels, personal income, state and local taxes, and population.

Only by attempting to determine gross and net changes will we be able to discover the impact on current Alaskans of these projects.

DRAFT

CONTRACT BETWEEN
STATE OF ALASKA
DEPARTMENT OF REVENUE
AND
UNIVERSITY OF ALASKA
INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH

The parties of this agreement are the STATE OF ALASKA, DEPARTMENT OF REVENUE, on behalf of the Legislative Committees on the Permanent Fund, hereinafter referred to as the "Department", and the UNIVERSITY OF ALASKA, INSTITUTE OF SOCIAL AND ECONOMIC RESEARCH, hereinafter referred to as the "Contractor".

THE PURPOSE OF THIS AGREEMENT is to provide the Legislature and the State with expert economic information on the expected effects of selected permanent fund management strategies.

IT IS THEREFORE MUTUALLY AGREED THAT:

CLAUSE I. - STATEMENT OF WORK

(A)

- (1) The Contractor shall review the policies which guided investment of the large general fund balance that developed in FY 1970, and identify the extent to which those policies were directed at influencing the rate and direction of growth in the Alaska economy or sectors thereof. Reference should be made to (a) the stated or recollected intentions of policy makers; and (b) the actual fiscal strategies pursued ~~as determined under (A)(2) of this clause.~~
- (2) The Contractor shall determine the chronology of those investments or other general fund management actions that had or were expected to have a direct impact on the Alaska economy ~~of their performance, including~~
- (3) The Contractor shall estimate, to the extent published banking statistics and other economic data permit, the actual impact of the ~~actions identified under (A)(2) of this clause,~~ ^{but not} identifying the possible sources and degree of uncertainty associated with this estimate. Included with this estimate shall be (a) a discussion of any capital substitution effects inferred from the data; (b) an assessment of any income redistributions resulting from the investment policies; and (c) calculations of the state's opportunity costs as measured by the actual returns on "outside" investments earned during comparable periods. ^{for future}
to

(4) The Contractor shall prepare and submit a written analysis of its findings under (A)(1) - (A)(3) above.



(B) The Contractor shall review the "Alaska Inc." proposal embodied in HB 525-SB 384 (Tenth Legislature) and provide written estimates over a twenty-year period of the effects the proposal would have on (1) personal income; (2) levels of employment; (3) population; and (4) any other regional economic indicators that the Contractor may consider relevant. In making these estimates, it is recognized that assumptions will need to be made concerning, inter alia, future personal consumption and saving patterns. It is recognized that qualitative judgment will be the source of many of these assumptions; however, each assumption shall be made explicit, as shall the reasons for making it. In addition, the Contractor shall estimate and report in writing on comparable effects of (1) retaining earnings in the permanent fund; (2) using fund earnings to lower personal income taxes; and (3) spending fund earnings as supplemental general fund revenues.

(C) The Contractor shall prepare a written report assessing the long-term economic and fiscal impacts of varying the amount of contributions paid into the permanent fund. Included in the report shall be an examination of minimum, maximum and intermediate levels of contributions to the fund and--assuming state expenditures consume the revenues remaining after permanent fund contributions--estimated impacts on (1) personal income; (2) population growth; (3) employment levels; and (4) permanent fund and general fund balances. In addition, the Contractor will devise a means for estimating contribution levels which would, by adjustment of appropriate co-efficients, leave sufficient general fund revenues to meet any legislatively pre-established level of real expenditure growth. Correspondingly, the contractor will also devise a means for estimating contribution levels that would generate sufficient earnings to accommodate predetermined proportions of the state's forecasted revenue requirements.

(D) The Contractor shall prepare and submit a written analysis of the economic and fiscal impacts of permanent fund investments in two hypothetical projects from distinct sectors of the Alaska economy. One project would be state investments in hatcheries and stream enhancement, directed at increasing salmon harvests as outlined in the report, The Economic Feasibility of Private Non-Profit Hatcheries by F. L. Orth. The second project would involve an investment in a petro-chemical facility. The details of the petro-chemical facility will be prepared by the Contractor in consultation with the Project Director. For each of the projects, the Contractor will trace the impacts of the investment in terms of changes in employment levels, personal income, state and local taxes, and population.

CLAUSE II. - PERIOD OF PERFORMANCE

- (A) Work under this contract shall be performed between 15 August 1977 and 15 December 1977, and shall be completed in order of task listing, with all tasks to be completed by 15 December 1977.
- (B) This contract may be terminated by written notice of either party to the other. In the event of termination by the Department, the Contractor shall receive a lump sum payment determined by multiplying the contract price (\$30,000) times the proportion of the total work completed by the Contractor. In the event of termination by the Contractor, this amount shall be reduced by one-half.

CLAUSE III. - PROJECT DIRECTOR

The Project Director shall be Representative Clark Gruening, Chairman, Subcommittee on the Alaska Permanent Fund (House).

CLAUSE IV. - COMPENSATION AND METHOD OF PAYMENT

- (A) Contractor's compensation for the work specified in Clause I shall be \$30,000, payable on completion of project (all four tasks), except that this amount shall be reduced by 10% if the work specified in Clause I is not delivered by the date specified in Clause II (15 December 1977), and by a further 1% of the contract price for each day of further delay.
- (B) Expenses incurred by the Contractor in the completion of the work set forth in Clause I shall be borne by the Contractor.

CLAUSE V. - RECORDS, DOCUMENTS, AUDIT

- (A) The Contractor shall maintain accurate records as may be required by the Project Director. The records are subject to inspection by the Department or the Project Director at all reasonable times.
- (B) All documents, reports and writings generated as a consequence of work done under this contract shall become the property of the State of Alaska, and on completion of the work or at the termination of this contract duplicate copies shall be delivered to the Project Director and to the Department.

CLAUSE VI. - REPORTS

The Contractor shall keep the Project Director informed as to the progress of the work performed under this agreement and shall provide progress reports as specified by him. A copy of each report shall be delivered to the Project Director, the Deputy Commissioner of Revenue (Treasury) and to the chairman of the Subcommittee on the Alaska Permanent Fund (Senate).

CLAUSE VII. - ALL WRITINGS CONTAINED HEREIN

This agreement contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this agreement shall be deemed to exist or to bind either of the parties of this agreement.

IN WITNESS WHEREOF, the parties have executed this agreement on the dates noted.

UNIVERSITY OF ALASKA, INSTITUTE OF
SOCIAL AND ECONOMIC RESEARCH

STATE OF ALASKA
DEPARTMENT OF REVENUE

E. LEE GORSUCH

Date

JAMES EDENSO

Date

Accepted:

CLARK GRUENING, Chairman
Subcommittee on the
Alaska Permanent Fund (House)

Date

POT IN
Penalty Clause

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CLAUSE I. - STATEMENT OF WORK

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(3) The Contractor shall estimate, to the extent published banking statistics and other economic data permit, the actual impact of the actions identified under (A)(2) of this clause, identifying the possible sources and degree of uncertainty associated with this estimate. Included with this estimate shall be (a) a discussion of any capital substitution effects inferred from the data; (b) an assessment of any income redistributions resulting from the investment policies; and (c) calculations of the state's opportunity costs as measured by the actual returns on "outside" investments earned during comparable periods.

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doing

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add formula inflation

(B) The Contractor shall review the "Alaska Inc." proposal embodied in HB 525-SB 384 (Tenth Legislature) and provide written estimates over a twenty-year period of the effects the proposal would have on (1) personal income; (2) levels of employment; (3) population; and (4) any other regional economic indicators that the Contractor may consider relevant. In making these estimates, it is recognized that assumptions will need to be made concerning, inter alia, future personal consumption and saving patterns. It is recognized that qualitative judgment will be the source of many of these assumptions; however, each assumption shall be made explicit, as shall the reasons for making it. In addition, the Contractor shall estimate and report in writing on comparable effects of (1) retaining earnings in the permanent fund; (2) using fund earnings to lower personal income taxes; and (3) spending fund earnings as supplemental general fund revenues. *down in state*

HB 300

add formula

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net benefit

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