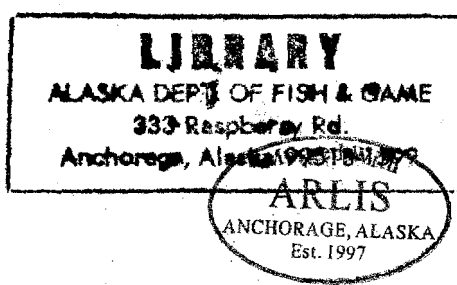


2809

562



ALASKA POWER AUTHORITY

draft 16 Apr 84

Doc. 2809

Alaska Department of Fish and Game
Anchorage, Alaska 99518-1177

the 1990s, the number of people in the United States who are 65 years of age or older has increased by 50% (U.S. Census Bureau, 1997). The number of people aged 65 and older is projected to increase to 20% of the total population by the year 2020 (U.S. Census Bureau, 1997). The number of people aged 65 and older is projected to increase to 20% of the total population by the year 2020 (U.S. Census Bureau, 1997). The number of people aged 65 and older is projected to increase to 20% of the total population by the year 2020 (U.S. Census Bureau, 1997).

[illegible]

Demco, Inc. 38-293

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

"Talkeetna Public Meeting"
Susitna Hydroelectric Project Document Index

SUSITNA HYDROELECTRIC PROJECT PUBLIC MEETINGS

◦ INTRODUCTION

◦ PROJECT DESCRIPTION, BACKGROUND AND SCHEDULE

◦ ECONOMIC FEASIBILITY

◦ ENVIRONMENTAL

◦ FINANCING

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

TK
1425
.58
A23
no. 2809

3 3755 000 44127 9

INTRODUCTION

- **PURPOSE OF PUBLIC MEETINGS**
- **PARTICIPANTS IN SUSITNA PROJECT
PLANNING AND DEVELOPMENT**

PURPOSE OF PUBLIC MEETINGS

- **INFORM PUBLIC OF**

- **CURRENT PROJECT STATUS**
- **UPDATED PROJECT FEASIBILITY**
- **UPDATED PROJECT ENVIRONMENTAL IMPACTS**
- **FINANCING OPTIONS**

- **RECEIVE PUBLIC COMMENT TO BE INCLUDED AS APPROPRIATE IN FINAL SUSITNA ECONOMIC AND FINANCIAL FEASIBILITY UPDATE REPORT**

PARTICIPANTS IN SUSITNA PLANNING AND DEVELOPMENT

- **ALASKA POWER AUTHORITY**
- **FEDERAL ENERGY REGULATORY COMMISSION**
- **RESOURCE AGENCIES**
- **ADMINISTRATION**
- **LEGISLATURE**
- **PUBLIC**

PROJECT DESCRIPTION, BACKGROUND AND SCHEDULE

- **PROJECT LOCATION AND DESCRIPTION**
- **BACKGROUND**

PREVIOUS STUDIES OF THE SUSITNA PROJECT

HISTORY

COST STATUS

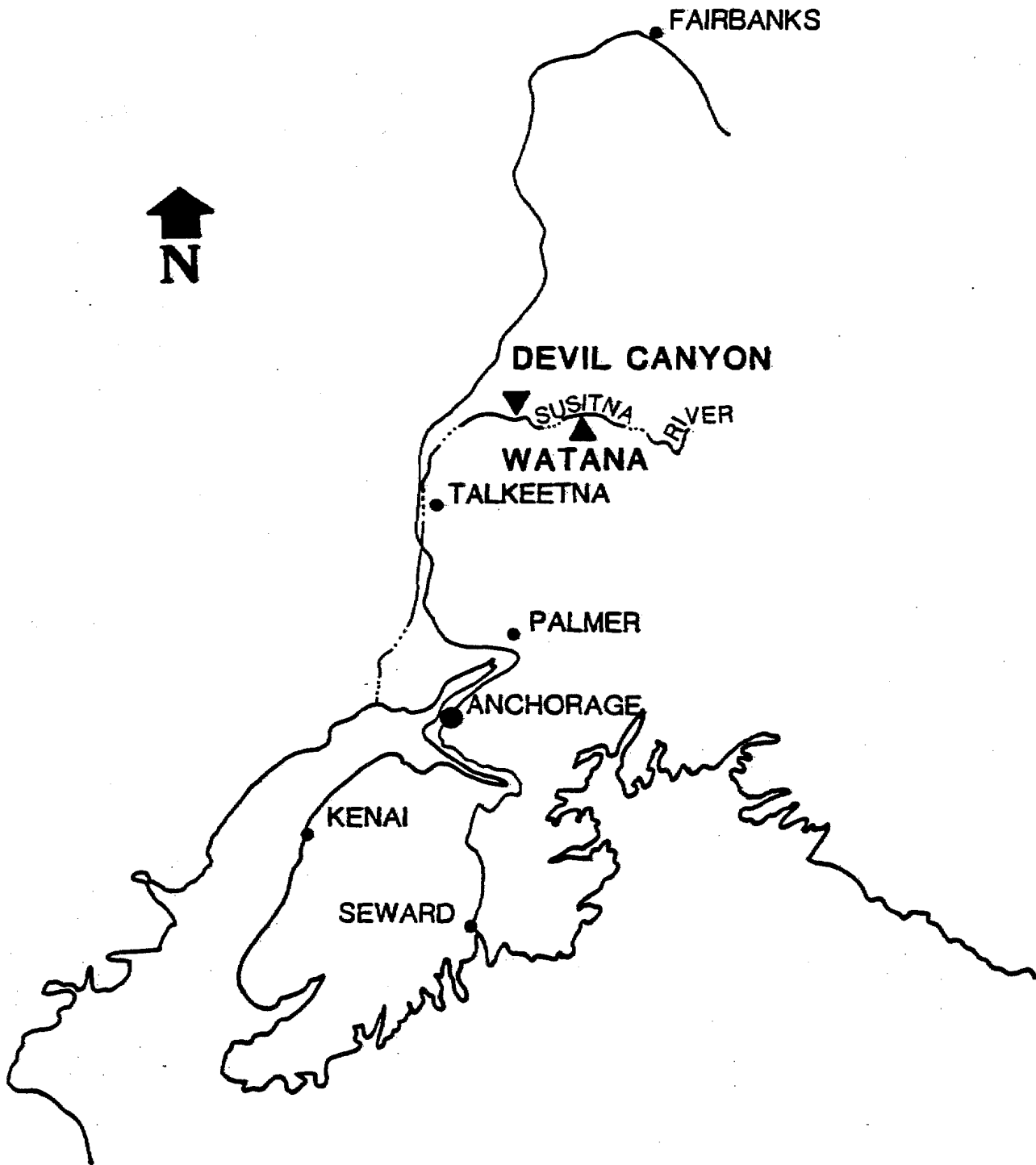
- **SCHEDULE**

PROJECT DEVELOPMENT

FEDERAL ENERGY REGULATORY COMMISSION

- **TOTAL PROJECT COSTS**

RAILBELT AREA MAP



PREVIOUS STUDIES OF THE SUSITNA PROJECT

ORGANIZATION	YEAR	TYPE OF STUDY
U. S. BUREAU OF RECLAMATION	1953	DAM SITE IDENTIFICATION
U.S. BUREAU OF RECLAMATION	1961	FEASIBILITY
ALASKA POWER ADMINISTRATION	1974	UPDATE USBR 1961
KAISER (FOR STATE OF ALASKA)	1974	PROPOSAL FOR DEVELOPMENT
U. S. ARMY CORPS OF ENGINEERS	1975	FEASIBILITY REPORT
U. S. ARMY CORPS OF ENGINEERS	1979	UPDATED 1975 REPORT

PROJECT HISTORY

- **POWER AUTHORITY ASSUMED PROJECT** **1979**
- **FEASIBILITY STUDY STARTED** **1980**
- **FEASIBILITY STUDY COMPLETED** **1982**
- **FERC LICENSE FILED** **FEB 1983**
- **REVISED LICENSE INFORMATION FILED** **JUL 1983**
- **LICENSE APPLICATION ACCEPTED** **JUL 1983**
- **STARTED SETTLEMENT PROCESS** **NOV 1983**
- **AGENCY COMMENTS RECEIVED** **DEC 1983**
- **POWER AUTHORITY RESPONSE TO COMMENTS FILED** **JAN-FEB 1984**

COST STATUS - WHAT ?

	FY80-FY84 <u>\$000</u>	FY85 BUDGET <u>\$000</u>
MANAGEMENT	15,608	8,812
ENVIRONMENTAL	42,186	15,367
ENGINEERING STUDIES & FERC SUPPORT	33,590	7,968
CONTINGENCY	<u>1,280</u>	<u>—</u>
TOTAL	<u><u>92,664</u></u>	<u><u>32,147</u></u>

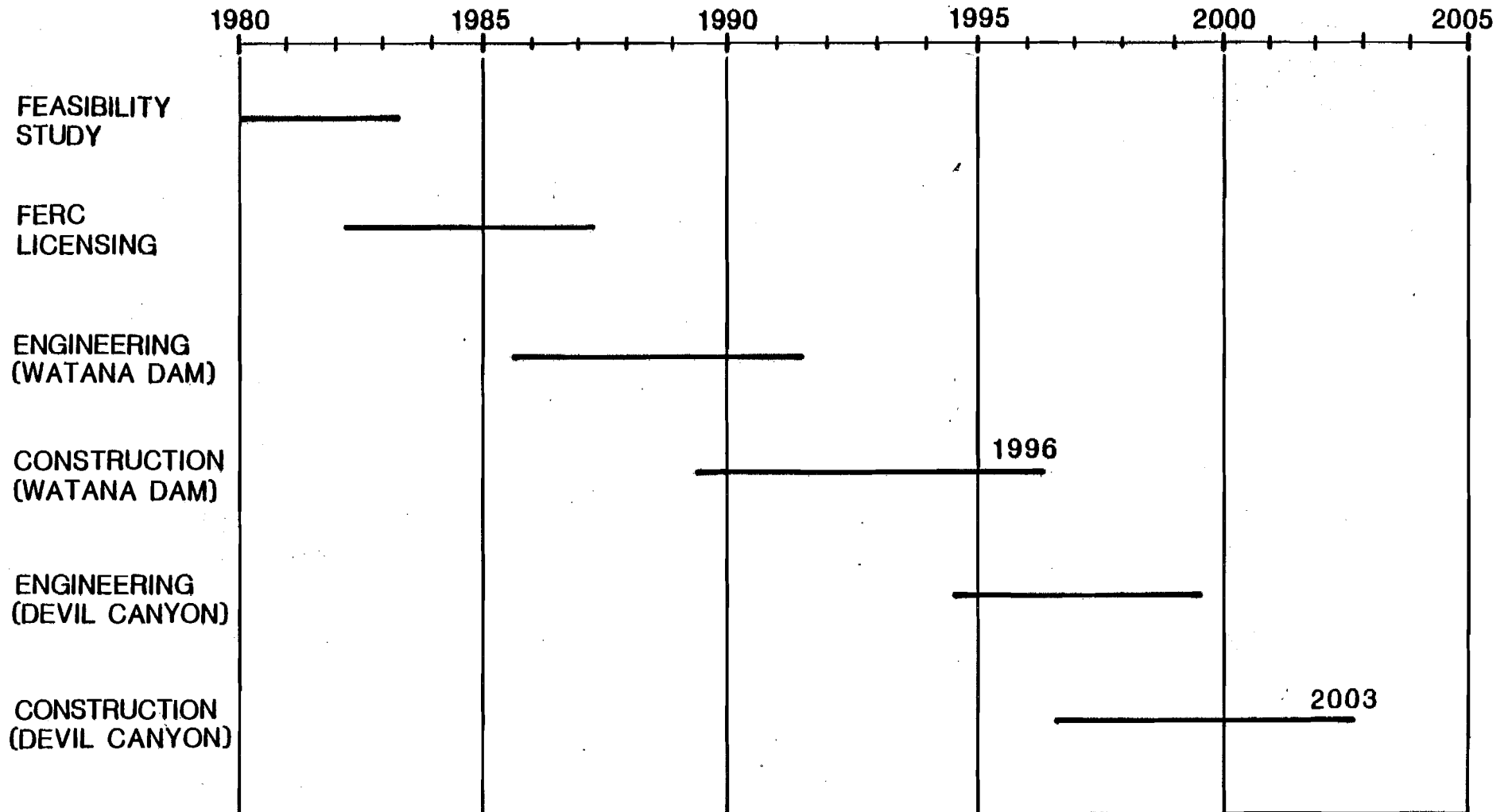
COST STATUS - WHO ?

	FY80-84 <u>\$000</u>	FY85 BUDGET <u>\$000</u>
FEDERAL AGENCIES	1,041	330
STATE AGENCIES	16,340	5,900
CONTRACTORS	74,023	25,917
CONTINGENCY	<u>1,280</u>	<u>—</u>
TOTAL	<u>92,664</u>	<u>32,147</u>

COST STATUS - WHEN ?

<u>FY</u>	<u>\$ 000</u>
80	15,328
81	5,636
82	18,100
83	25,600
84	<u>28,000</u>
TOTAL	<u><u>92,664</u></u>
FY 85 BUDGET REQUEST	32,147

SUSITNA PROJECT SCHEDULE



PROJECT LICENSE SCHEDULE

- FERC DRAFT EIS ISSUED MAY 1984
- NEED-FOR-POWER HEARINGS JULY 1984
- FERC FINAL EIS ISSUED DEC 1984
- ENVIRONMENTAL & DAM SAFETY HEARINGS APRIL 1985
- SIGN INITIAL POWER SALES AGREEMENTS JUNE 1985
- INITIATE DETAILED DESIGN JULY 1985
- FERC LICENSE ISSUED MAR 1987¹

¹ COULD BE EARLIER DEPENDING ON LENGTH OF HEARINGS

TOTAL PROJECT COSTS (MILLIONS - 1983 \$)

◦ WATANA - \$3,750

◦ DEVILS CANYON - 1,620

◦ TOTAL PROJECT \$5,370

◦ POSSIBLE COST REDUCTION
FROM DESIGN REFINEMENTS - \$292
(NOT CONSIDERED IN FEASIBILITY)

ECONOMIC FEASIBILITY

- **DEMAND FORECAST**
- **EXISTING GENERATION**
- **ALTERNATIVES TO MEET DEMAND**

GAS

COAL

HYDROELECTRIC

SUSITNA

NON-SUSITNA

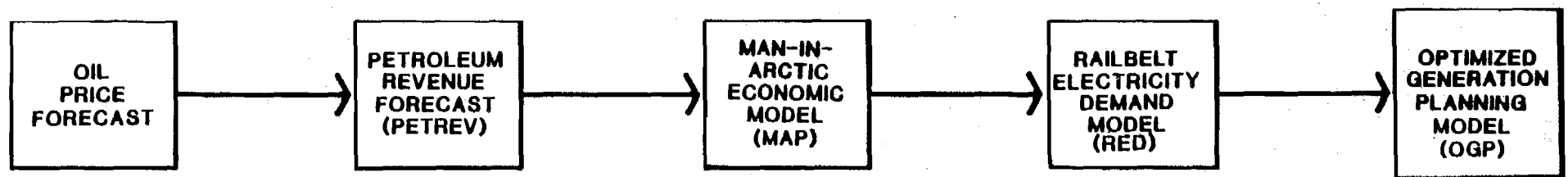
OTHER

- **OPTIMUM GENERATION PLANNING**
- **CONCLUSIONS**

DEMAND FORECAST

- **METHODOLOGY USED TO DETERMINE FORECAST**
- **FACTORS AFFECTING FORECAST**
- **CONCLUSION (FORECAST)**

METHODOLOGY OF DEMAND FORECASTING



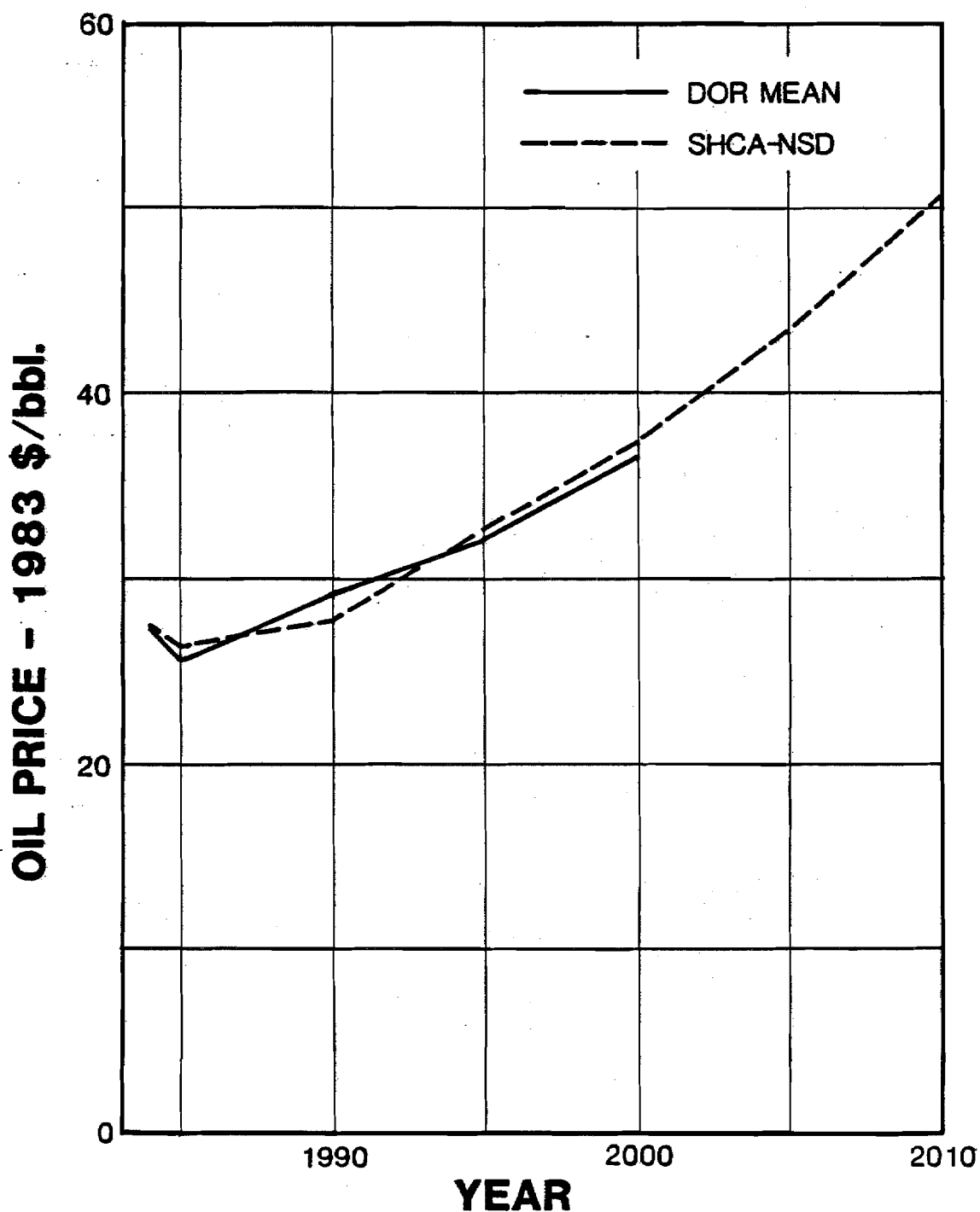
FACTORS AFFECTING DEMAND FORECAST

- **OIL PRICE FORECAST**
- **PETROLEUM REVENUE FORECAST**
- **GROWTH FORECAST**

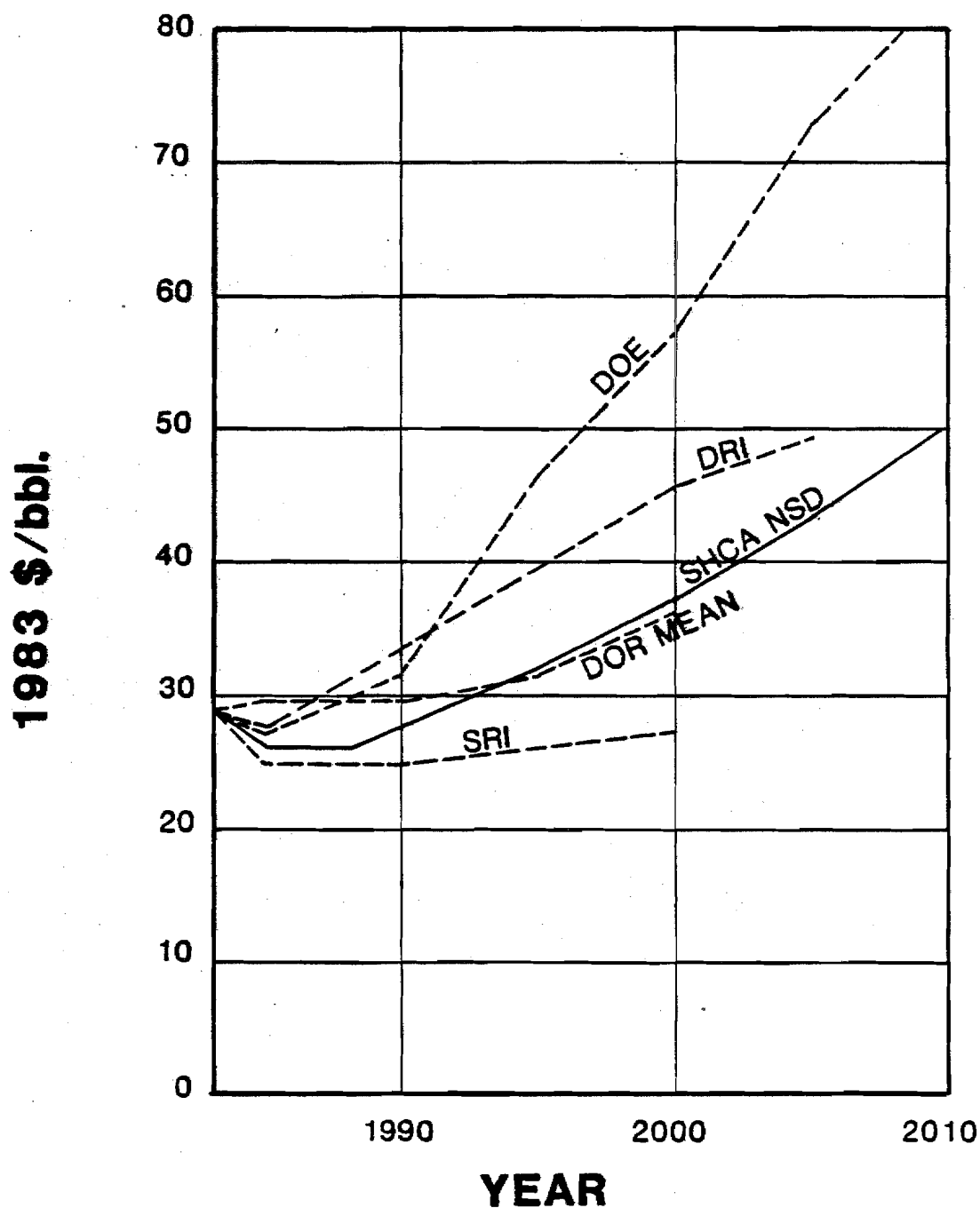
OIL PRICES

- **SHERMAN H. CLARK - NO SUPPLY DISRUPTION
(REFERENCE CASE)**
- **ALASKA DEPARTMENT OF REVENUE - DOR 1983 MEAN**

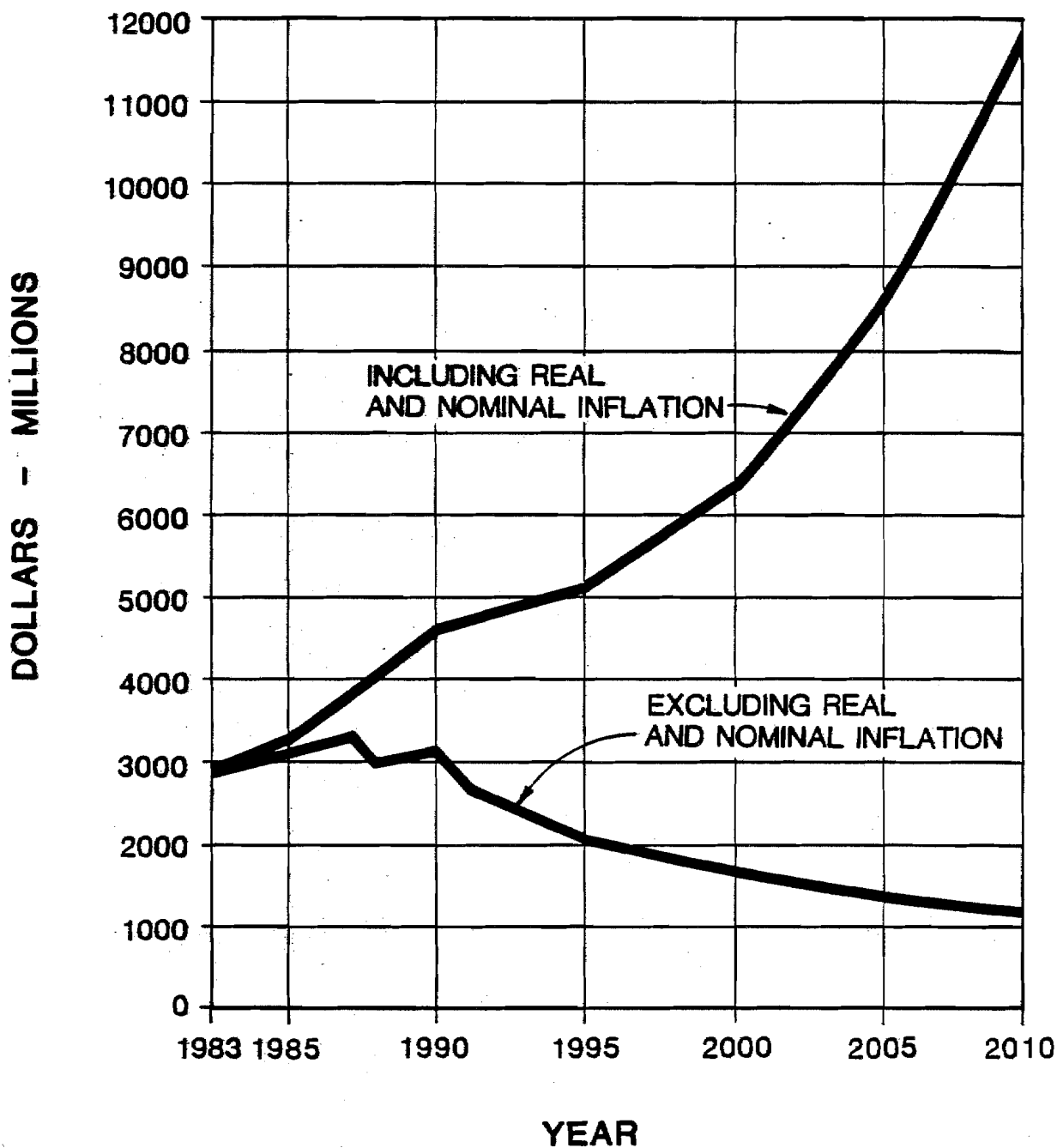
ALTERNATIVE OIL PRICE PROJECTIONS



ALTERNATIVE OIL PRICE PROJECTIONS

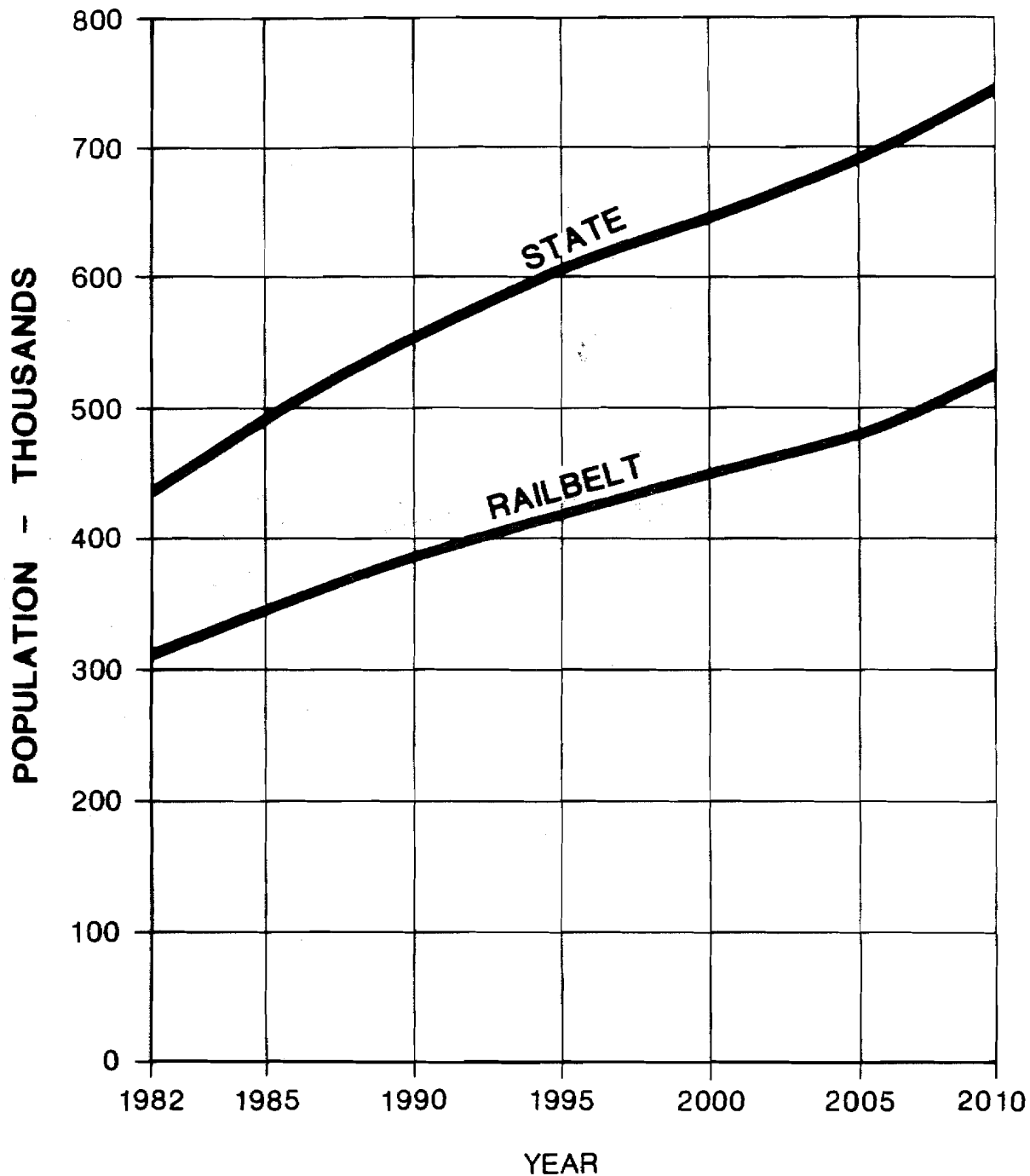


STATE PETROLEUM REVENUES FORECAST OF ANNUAL CONTRIBUTION TO GENERAL FUND



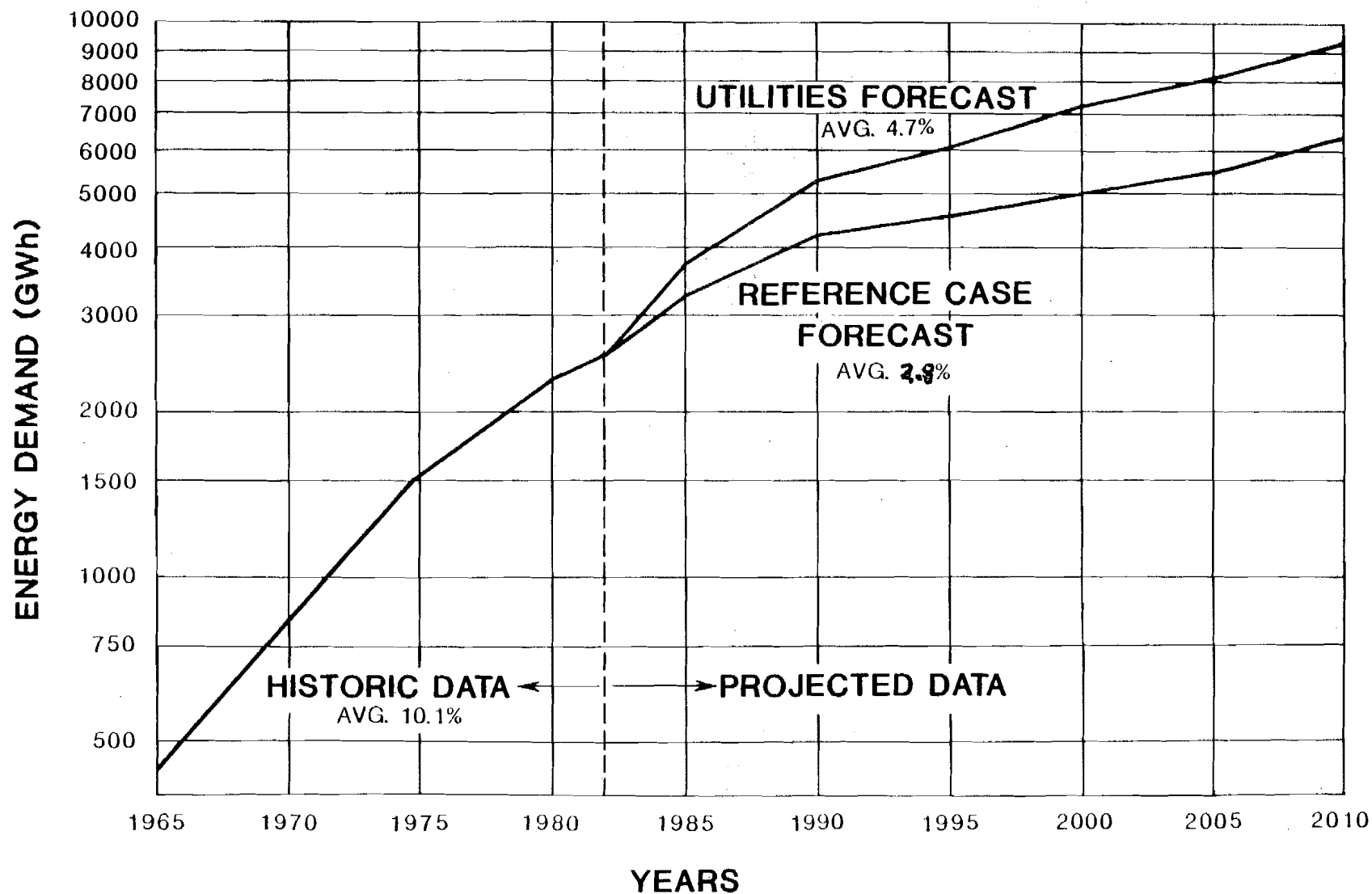
SOURCE: MAP MODEL

POPULATION GROWTH FORECAST



SOURCE: MAP MODEL

ENERGY DEMAND FORECAST



EXISTING GENERATION

- **RAILBELT CAPACITY (RETIREMENT)**
- **LOCATION**
- **DEMAND VS RESOURCES**

EXISTING RAILBELT CAPACITY/AFTER RETIREMENT

	1984	1993
SIMPLE CYCLE GAS ^①	664	373
COMBINED CYCLE GAS ^②	317	317
COAL-STEAM ^③	70	60
HYDRO ^④	46	46
TOTAL	1097	796

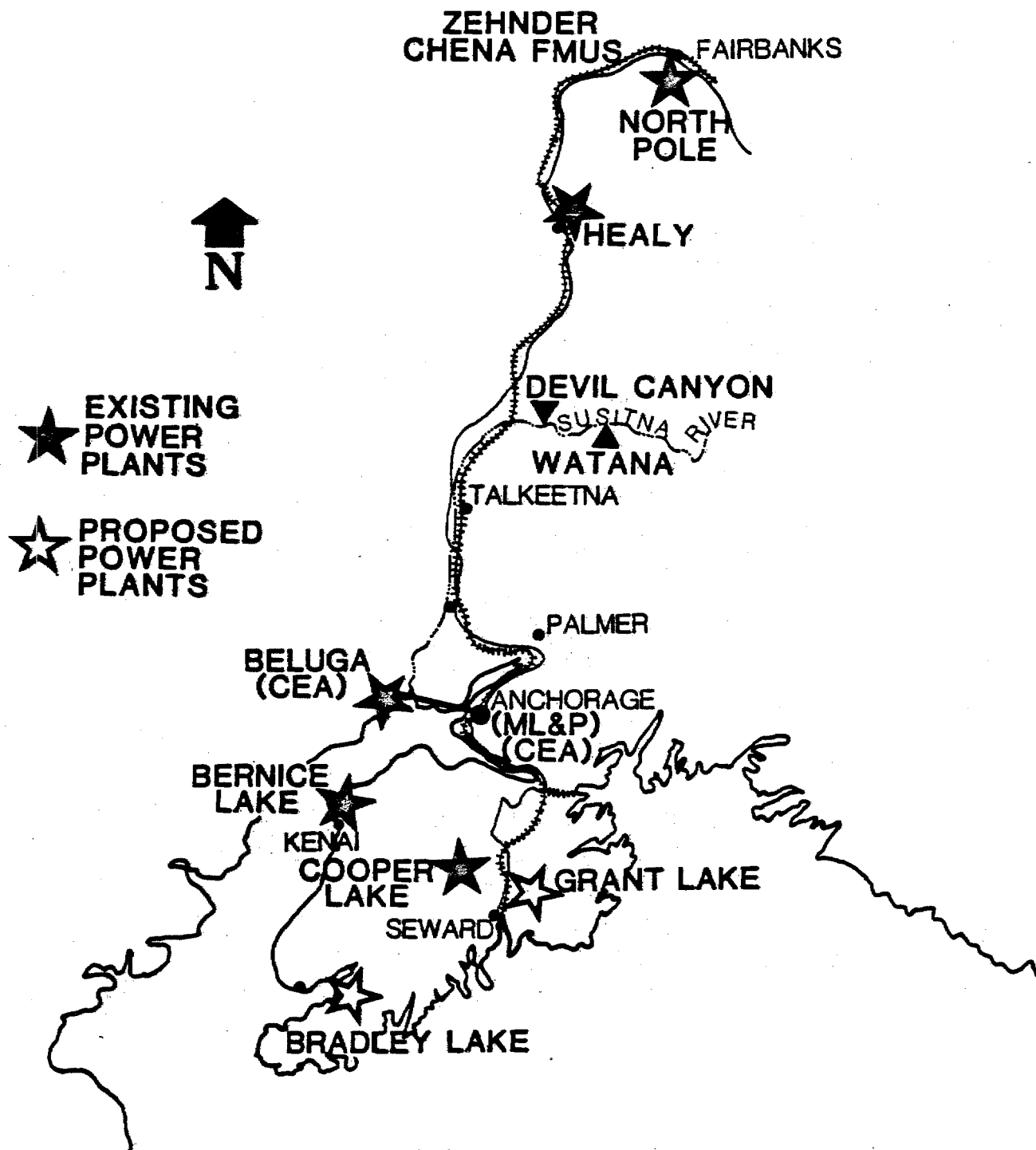
① 20 YEAR LIFE

② 30 YEAR LIFE

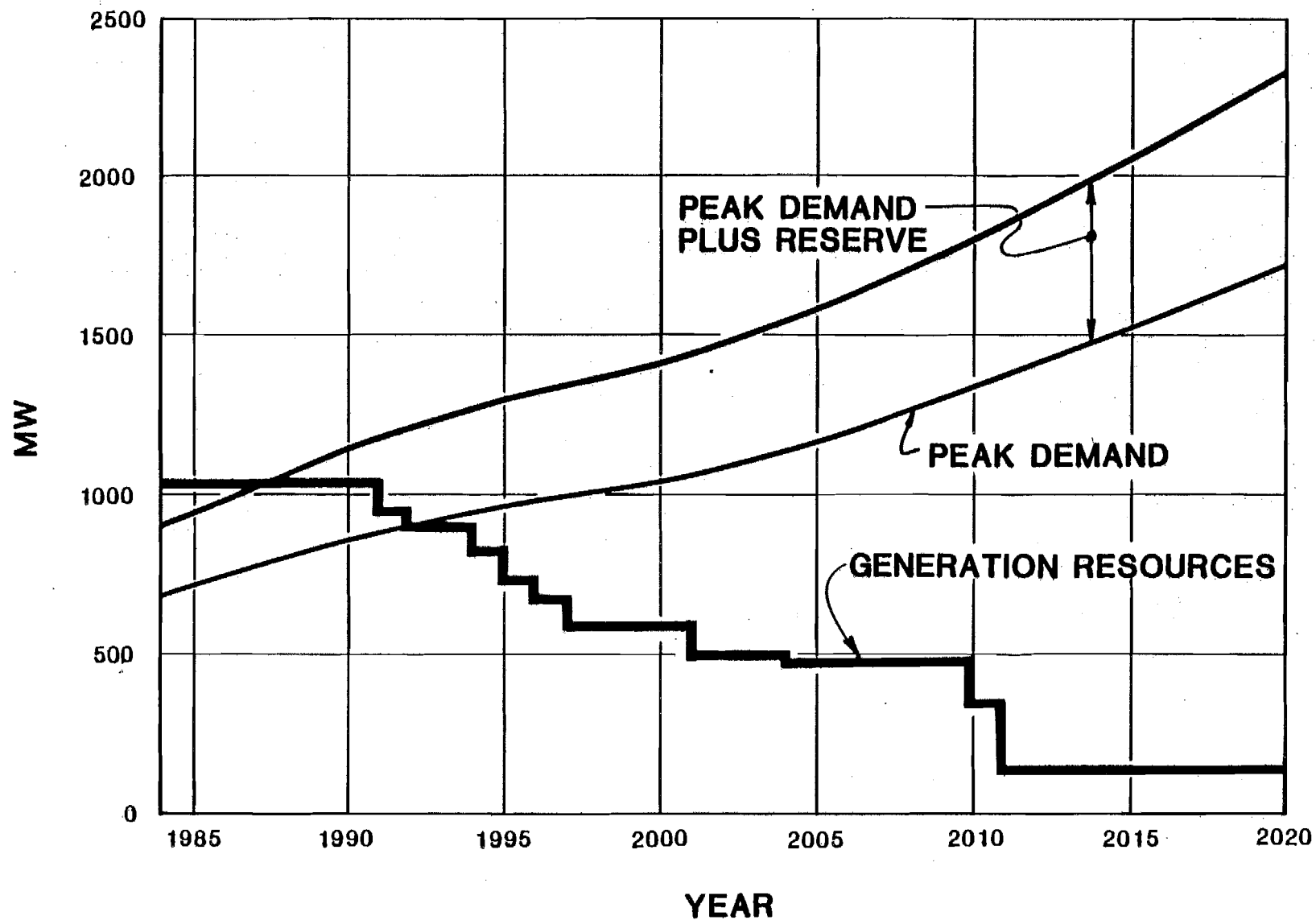
③ 30 YEAR LIFE

④ 50 YEAR LIFE

RAILBELT GENERATION RESOURCES



PEAK POWER DEMAND / GENERATION RESOURCES



ALTERNATIVES TO MEET DEMAND

- **NATURAL GAS FIRED**

- **COAL FIRED**

- **HYDROELECTRIC**

- **OTHER**

NATURAL GAS FIRED UNITS

- **PLANT TYPES**
- **AVAILABILITY**
- **FUEL PRICE PROJECTIONS**
- **ENVIRONMENTAL IMPACTS**

GAS FIRED TURBINE - PLANT TYPES

- **SIMPLE CYCLE - 85 MW - 29% EFFICIENCY**
- **COMBINED CYCLE* - 237 MW - 41% EFFICIENCY**

*** DUAL SIMPLE CYCLE TURBINES DRIVING A THIRD
WASTE HEAT STEAM TURBINE**

GAS FIRED TURBINE - FUEL AVAILABILITY

- **PROVEN RESERVES (OGCC, 3.5 TCF) EXHAUSTED BY 1998**
- **RECOVERABLE UNDISCOVERED (DNR, 2.04 TCF) EXHAUSTED BY 2007**
- **AFTER 2007 - COOK INLET GAS SUPPLIED BY TAGS OR OTHER SOURCE**

NORTH SLOPE GENERATION

- **NORTH SLOPE GAS ELECTRIC GENERATION-TRANSMISSION
TO RAILBELT**
 - **REPORT BY EBASCO 1983**
 - **NOT ECONOMICALLY ATTRACTIVE**
 - **QUESTIONABLE RELIABILITY**
 - **SERIOUS TECHNICAL UNCERTAINTIES**

NATURAL GAS FUEL PRICE FORECASTS

	1983 ^①	1993
COOK INLET GAS	2.32	3.02
NORTH SLOPE GAS		4.22 ^②

① BASED ON CURRENT ENSTAR CONTRACT

② BASED ON DELIVERY TO FAIRBANKS (ANGTS)
OR KENAI (TAGS)

ENVIRONMENTAL IMPACTS

- **GAS FIELD-LOCATION AND DEVELOPMENT**
- **TRANSMISSION OF GAS**
- **POWER PLANT**
- **TRANSMISSION OF ENERGY**

COAL FIRED UNITS

- **PLANT TYPES**
- **AVAILABILITY**
- **FUEL PRICE PROJECTIONS**
- **ENVIRONMENTAL IMPACTS**

COAL FIRED STEAM PLANTS- PLANT TYPE

◦ **OPTIMUM CAPACITY IS 200 MW AT 35% EFF.**

COAL FIRED STEAM PLANTS - FUEL AVAILABILITY

- **NENANA MINEABLE BASE IS 457 MILLION TONS**
- **BELUGA RESOURCE IS 1.8 - 2.4 BILLION TONS**
- **MODEST QUALITY 7500 - 7800 BTU/LB**

COAL PRICE FORECAST

	REAL INCREASE		
	1983	1993	1993 - 2050
NENANA COAL ^②	1.72	2.17 ^①	1%
BELUGA COAL ^③	1.86	2.17 ^①	1%

① ASSUMES WORLD MARKET (1983 \$ / MMBTU)

② BASED ON CURRENT CONTRACTS (ADJUSTED) *

③ BASED ON 5 - 10 MILLION TPY EXPORT

* ADJUSTED FOR PRODUCTION LEVELS AND TRANSPORTATION COSTS

ENVIRONMENTAL

- **COAL FIELD-LOCATION**

- **MINE DEVELOPMENT**

- **POWER PLANT**

- **TRANSMISSION OF ENERGY**

HYDROELECTRIC

- **STUDIES**

- **ALTERNATIVES**

- SUSITNA**

- NON - SUSITNA**

- **FINDINGS**

STUDIES OF HYDROELECTRIC SITES IN RAILBELT

ORGANIZATION	YEAR	TYPE STUDY
U. S. BUREAU OF RECLAMATION	1967	INVENTORY
FEDERAL POWER COMMISSION	1969	INVENTORY
U. S. ARMY CORPS OF ENGINEERS	1975	FEASIBILITY
ALASKA POWER ADMINISTRATION	1980	INVENTORY
ALASKA POWER AUTHORITY	1982	FEASIBILITY

SUSITNA HYDROELECTRIC ALTERNATIVE

SUSITNA PROJECT

WATANA PHASE - 1020 MW

DEVIL CANYON PHASE - 600 MW

**ASSUMES BRADLEY LAKE AND GRANT LAKE WILL BE
CONSTRUCTED**

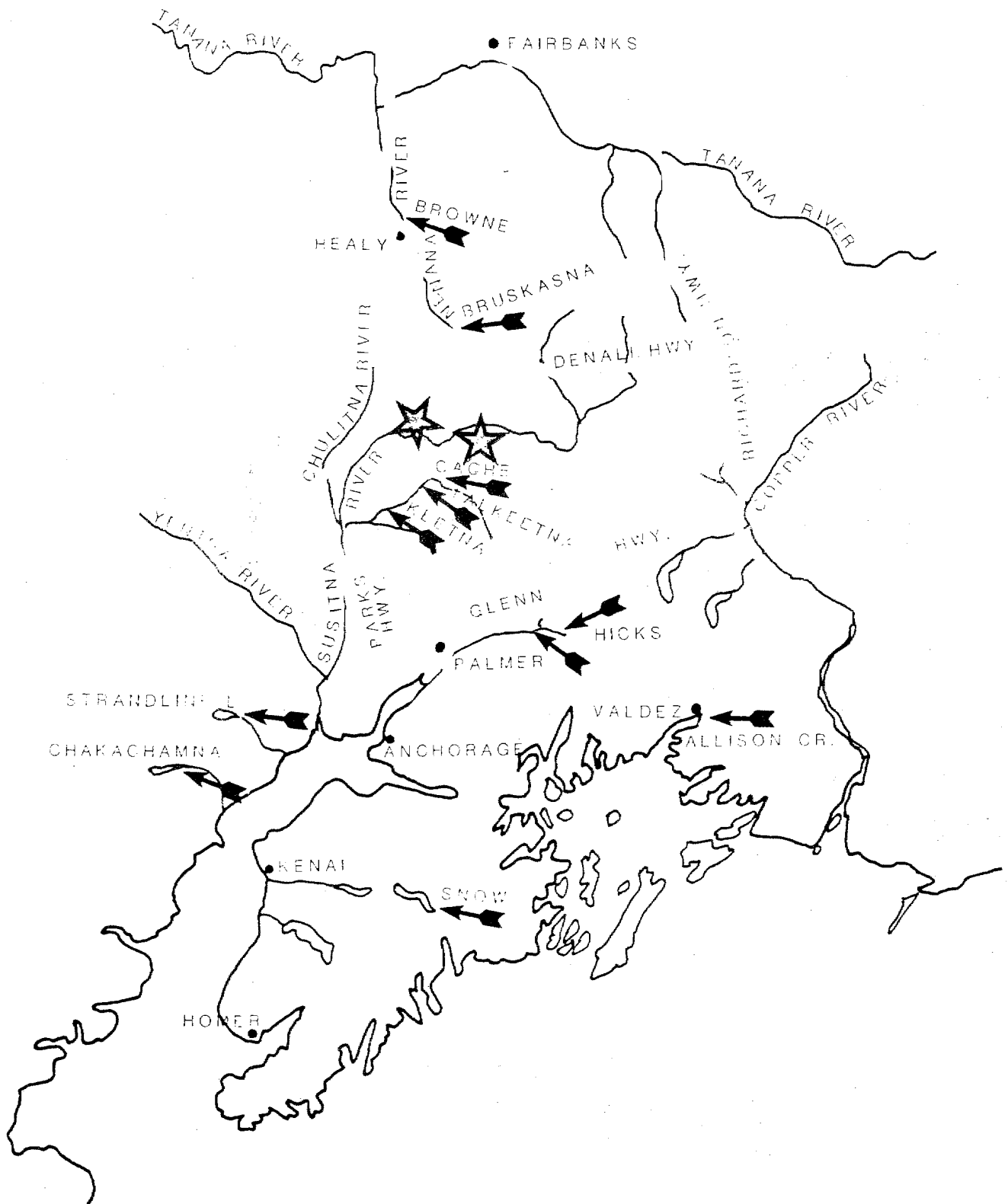
NON-SUSITNA HYDROELECTRIC ALTERNATIVES

- **ASSUMES BRADLEY LAKE AND GRANT LAKE ARE CONSTRUCTED**
- **CONSIDERED 91 POTENTIAL SITES IN RAILBELT**
- **REJECTED 26 SITES - NOT ECONOMICALLY VIABLE**
- **REJECTED 20 SITES WITH SIGNIFICANT ENVIRONMENTAL IMPACT**
- **46 SITES EVALUATED WITH TRANSMISSION LINKS FOR ECONOMY AND ENVIRONMENTAL IMPACTS -18 SITES REJECTED**
- **28 SITES CATEGORIZED BY SIZE AND RANKED BY ENVIRONMENTAL AND ECONOMIC CONSIDERATIONS**
- **10 SITES SELECTED FOR DETAILED COST ESTIMATES**

TEN SELECTED SITES

SITE	RIVER	CAPACITY (MW)	COST (MILLIONS)
SNOW	SNOW	50	255
BRUSKASNA	NENANA	30	238
KEETNA	TALKEETNA	100	477
CACHE	TALKEETNA	50	564
BROWNE	NENANA	100	625
TALKEETNA 2	TALKEETNA	50	500
HICKS	MATANUSKA	60	529
CHAKACHAMNA	CHAKACHAMNA	330	1,480
ALLISON	ALLISON CREEK	8	54
STRANDLINE LAKE	BELUGA	20	126

SELECTED ALTERNATIVE HYDROELECTRIC SITES



SELECTED DEVELOPMENT

◦ CONSTRUCTION OF:

SITE	CAPACITY (MW)	ON LINE DATE
CHAKACHAMNA	330	1993
KEETNA	100	1997
SNOW	50	2002

◦ SUPPLEMENT CAPACITY SHORTFALL WITH THERMAL GENERATION

◦ TOTAL SYSTEM COST OF \$ 7.04 BILLION VS \$ 5.7 FOR SUSITNA (PRESENT WORTH)

NON-SUSITNA HYDROELECTRIC ALTERNATIVES

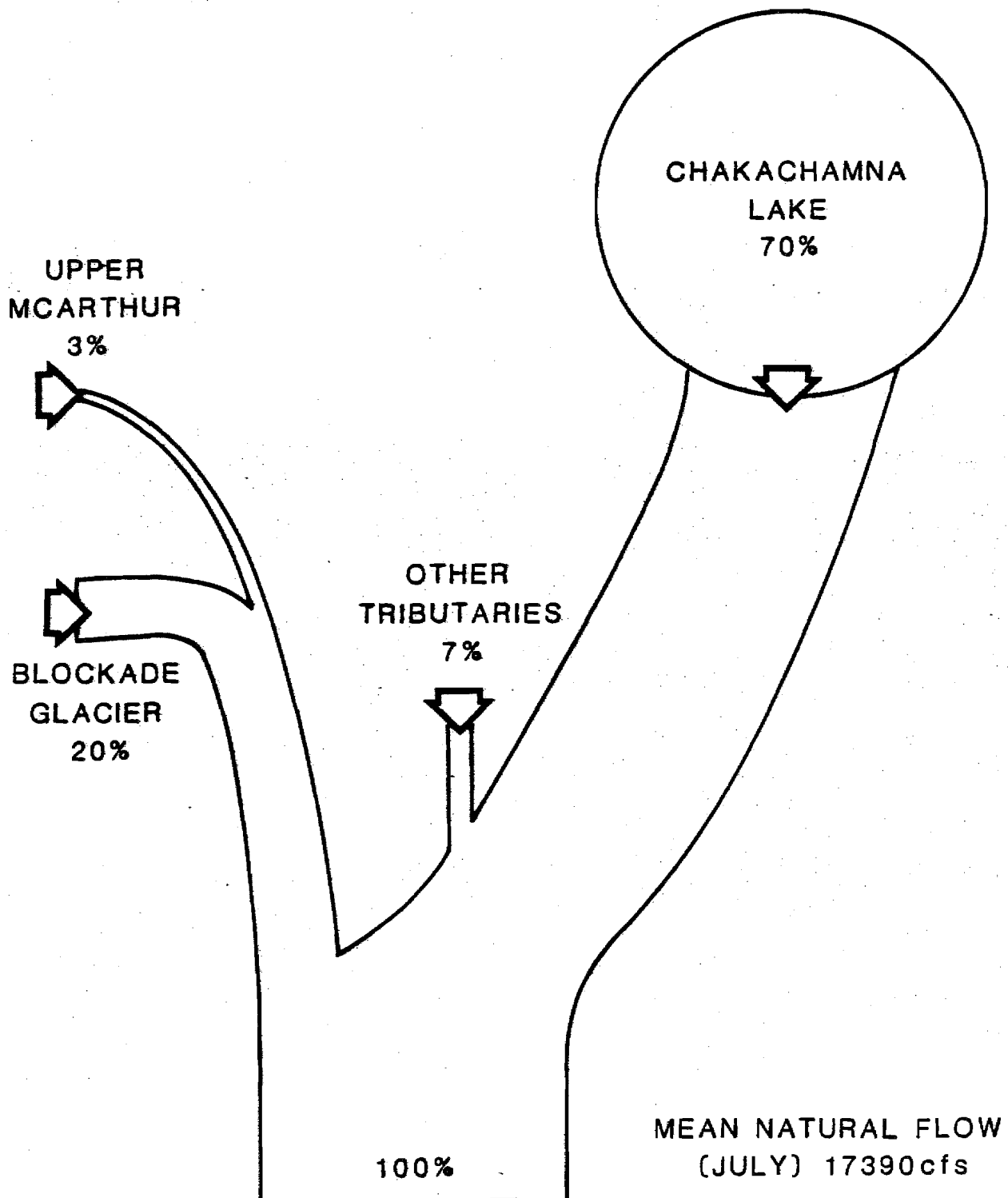
- **CHAKACHAMNA IS KEY PROJECT DUE TO CAPACITY**
- **ALASKA POWER AUTHORITY SELECTS BECHTEL TO DO
DETAILED REPORT**
- **BECHTEL REPORT COMPLETED MARCH 1983**

CHAKACHAMNA DETAIL REPORT

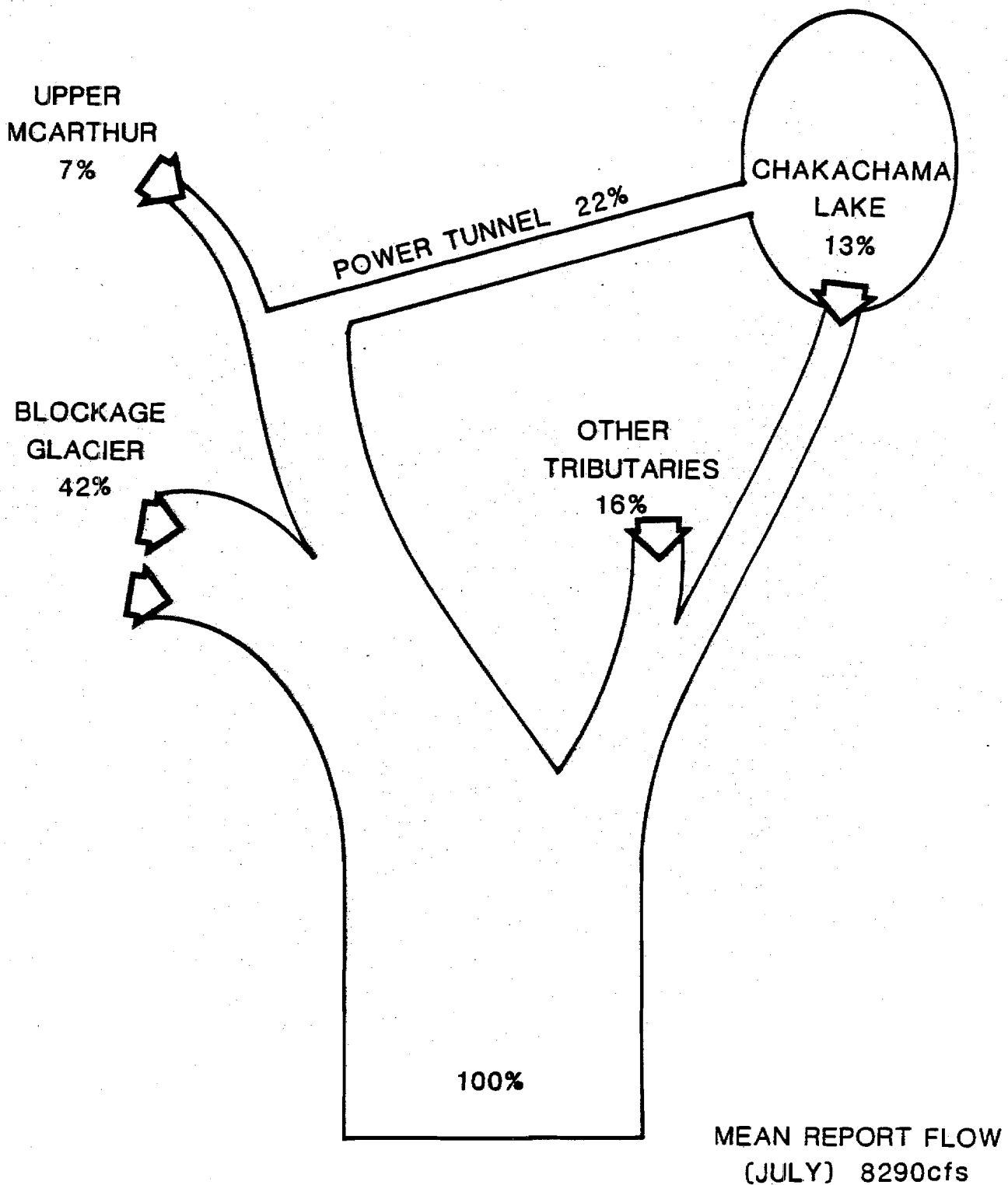
(BECHTEL MARCH 1983)

- **330 MW CAPACITY**
- **10 MILE POWER TUNNEL**
- **50 FT. DAM WITH FISH PASSAGE**
- **POWER HOUSE ON TIDEWATER AT MCARTHUR RIVER**
- **\$1.44 BILLION CONSTRUCTION COST (1983 \$)**
- **SIGNIFICANT IMPACT TO 70,000+ SALMON**
- **ADDITIONAL FISHERIES STUDIES REQUIRED**

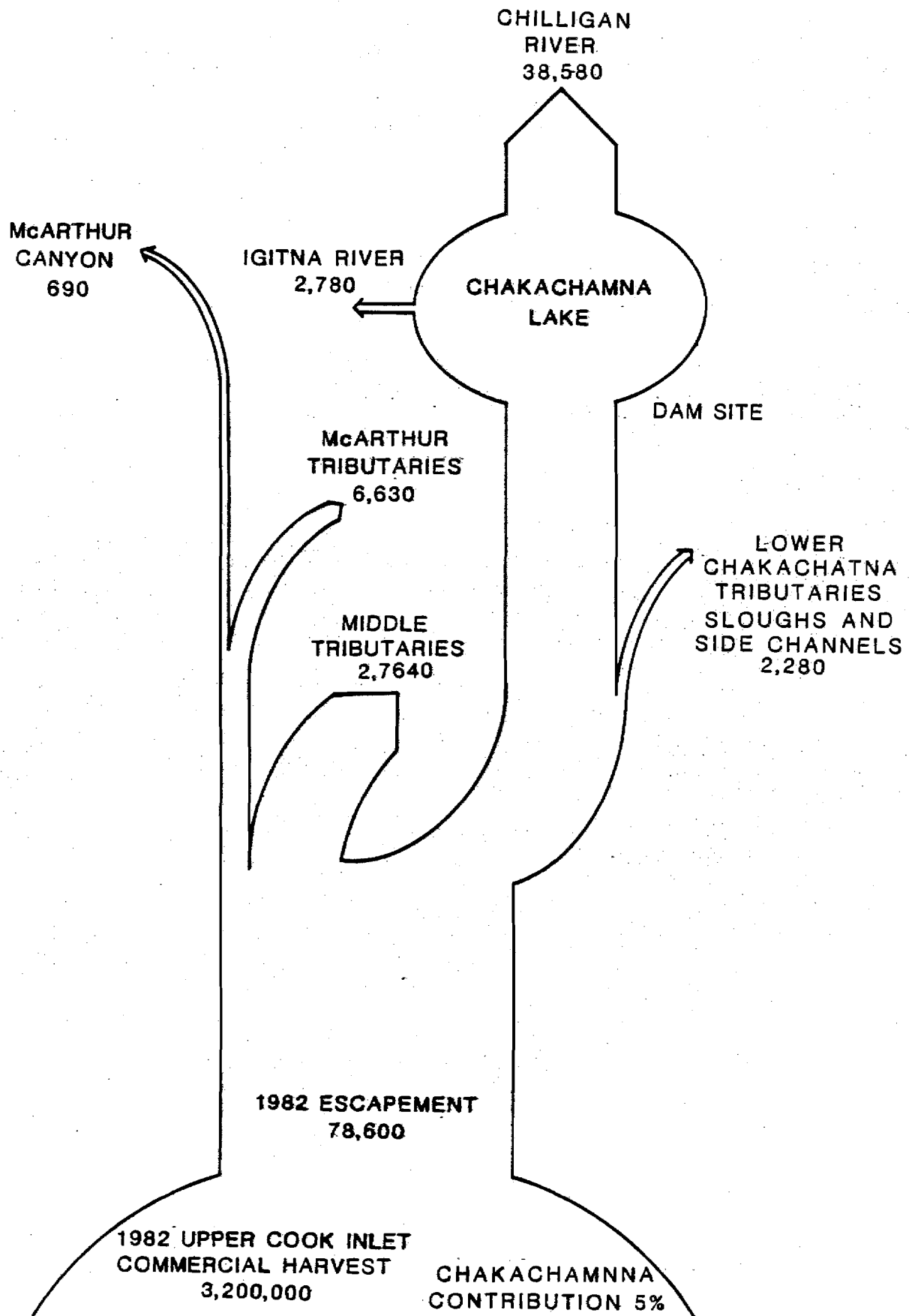
CONTRIBUTION TO CHAKACHAMNA SYSTEM FLOW (JULY, PRE-PROJECT)



CONTRIBUTION TO CHAKACHAMA SYSTEM FLOW (JULY, PROJECT FLOWS)



1982 CHAKACHAMNA SOCKEYE



NON-SUSITNA HYDROELECTRIC ALTERNATIVES FINDINGS

- **CHAKACHAMNA HAS SIGNIFICANT ENVIRONMENTAL IMPACTS**
- **ALTERNATIVE HYDRO WITH CHAKACHAMNA NOT ECONOMICALLY OR ENVIRONMENTALLY COMPETITIVE WITH SUSITNA - \$ 7.04 VS \$ 5.7 BILLION**
- **VALIDATED RESULT OF ALASKA POWER ADMINISTRATION 1980 RAILBELT STUDY PRINCIPAL FINDING:**
 - ” **THERE ARE NO HYDRO GENERATION OPPORTUNITIES AVAILABLE TO GENERATE POWER IN SUFFICIENT QUANTITY TO BE AN ALTERNATIVE TO THE SUSITNA PROJECT.**”

OTHER ALTERNATIVES TO MEET DEMAND

- **DIESEL - EVALUATED AS THERMAL ALTERNATIVE**
- **ALTERNATIVE RESOURCES - BATTELLE ALTERNATIVES STUDY**
 - PEAT**
 - REFUSE**
 - GEO THERMAL**
 - WIND AND SOLAR**
- **CONSERVATION**
 - PRICE INDUCED**
 - PROGRAM INDUCED**

OPTIMUM GENERATION PLANNING - (OGP)

- **INPUTS TO OGP MODEL**
- **OGP COMPUTER ANALYSIS**
- **ADDITIONAL GENERATION REQUIRED - ALTERNATIVES**
 - NON-SUSITNA**
 - SUSITNA**
- **COMPARISON OF CAPACITY BY ALTERNATIVE**
- **COMPARISON OF CAPACITY/DEMAND BY ALTERNATIVE**
- **ALTERNATE ENERGY DEMAND AND DELIVERY**
- **CONCLUSIONS**
- **SENSITIVITY**

INPUTS TO OGP MODEL

- **AVAILABLE TYPES OF GENERATION**
- **UNIT COSTS**
- **FUEL COSTS**
- **OPERATION AND MAINTENANCE COSTS**
- **LOAD PROJECTION**
- **LOAD SHAPE**
- **LOSS OF LOAD PROBABILITY**
- **ECONOMIC PARAMETERS**

OPTIMUM GENERATION PLAN (OGP) COMPUTER ANALYSIS

- **CONSIDER ANNUAL PEAK LOAD AND ENERGY REQUIREMENTS**
- **SELECT NEW RESOURCE FROM AVAILABLE OPTIONS**
- **CONDUCT ECONOMIC LIFE CYCLE ANALYSIS OF PLAN**
- **COMPARE PRESENT WORTH OF VARIOUS PLANS TO DETERMINE LOWEST COST PLAN WITH AND WITHOUT SUSITNA**

ADDITIONAL GENERATION NON SUSITNA PLAN

YEAR	RESOURCE	CAPACITY (MW)	LOCATION
1988	BRADLEY & GRANT	97	KENAI
1991-92	SCGT	168	COOK INLET
1993	CCGT	237	COOK INLET
1993	DOUBLE CIRCUIT	345 KV	ANCH/FBKS
1994-97	SCGT	336	COOK INLET
2000-2002	COAL	400	BELUGA
2000	DOUBLE CIRCUIT	230 KV	BELUGA-ANCH
2006-08	COAL	400	NENANA
2011-15	COAL	400	BELUGA
2014-19	SCGT	420	COOK INLET
2020	COAL	200	BELUGA

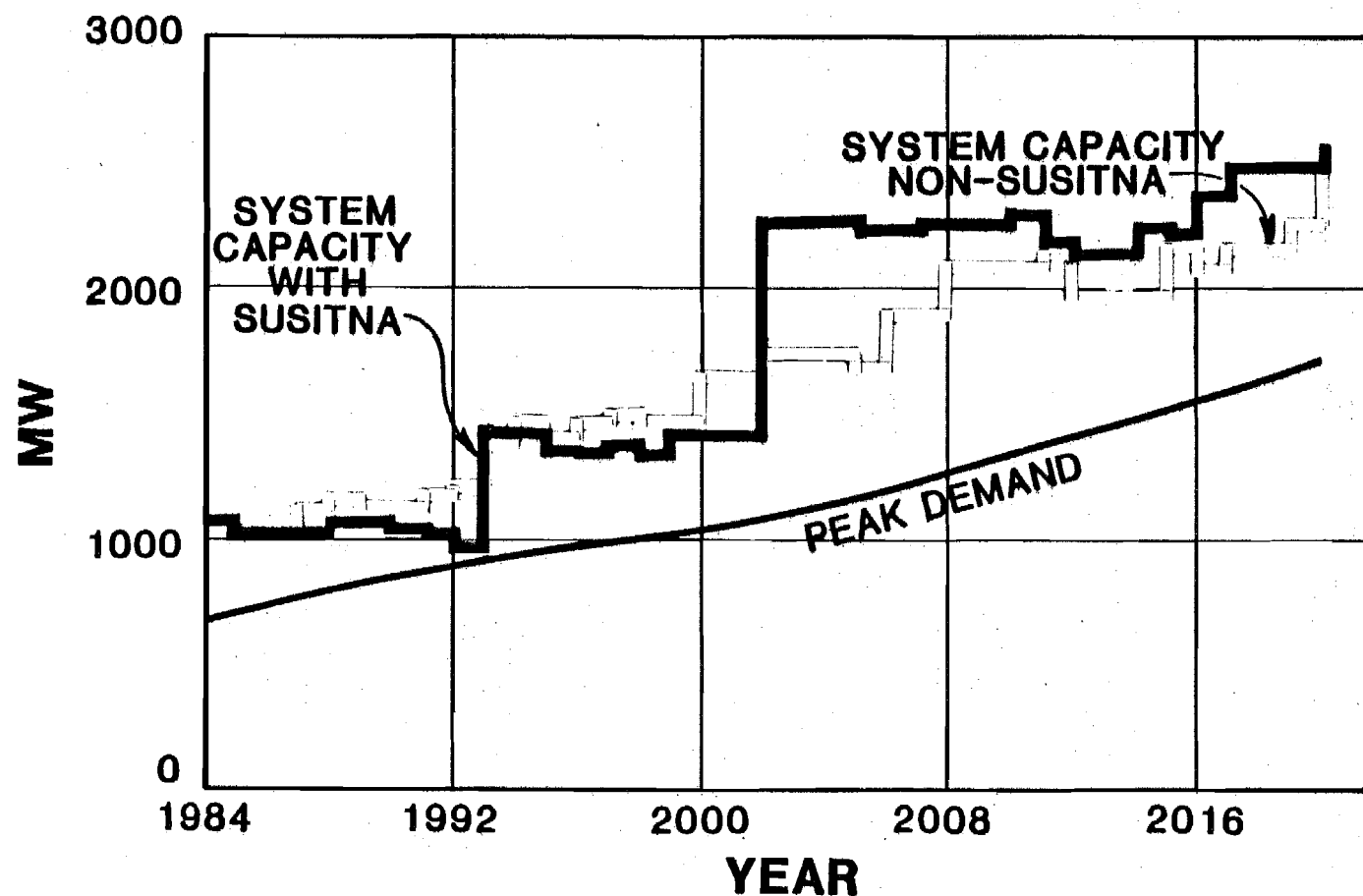
ADDITIONAL GENERATION SUSITNA PLAN

YEAR	RESOURCE	CAPACITY(MW)	LOCATION
1988	BRADLEY & GRANT	97	KENAI
1993	WATANA	539	SUSITNA
1993	DUAL TRANSMISSION	345 KV	ANCH / FBKS
1996-99	SCGT	252	COOK INLET
2002	DEVIL CANYON	1620	SUSITNA
2012-14	SCGT	252	COOK INLET
2016	CCGT	237	COOK INLET
2017-20	SCGT	336	COOK INLET

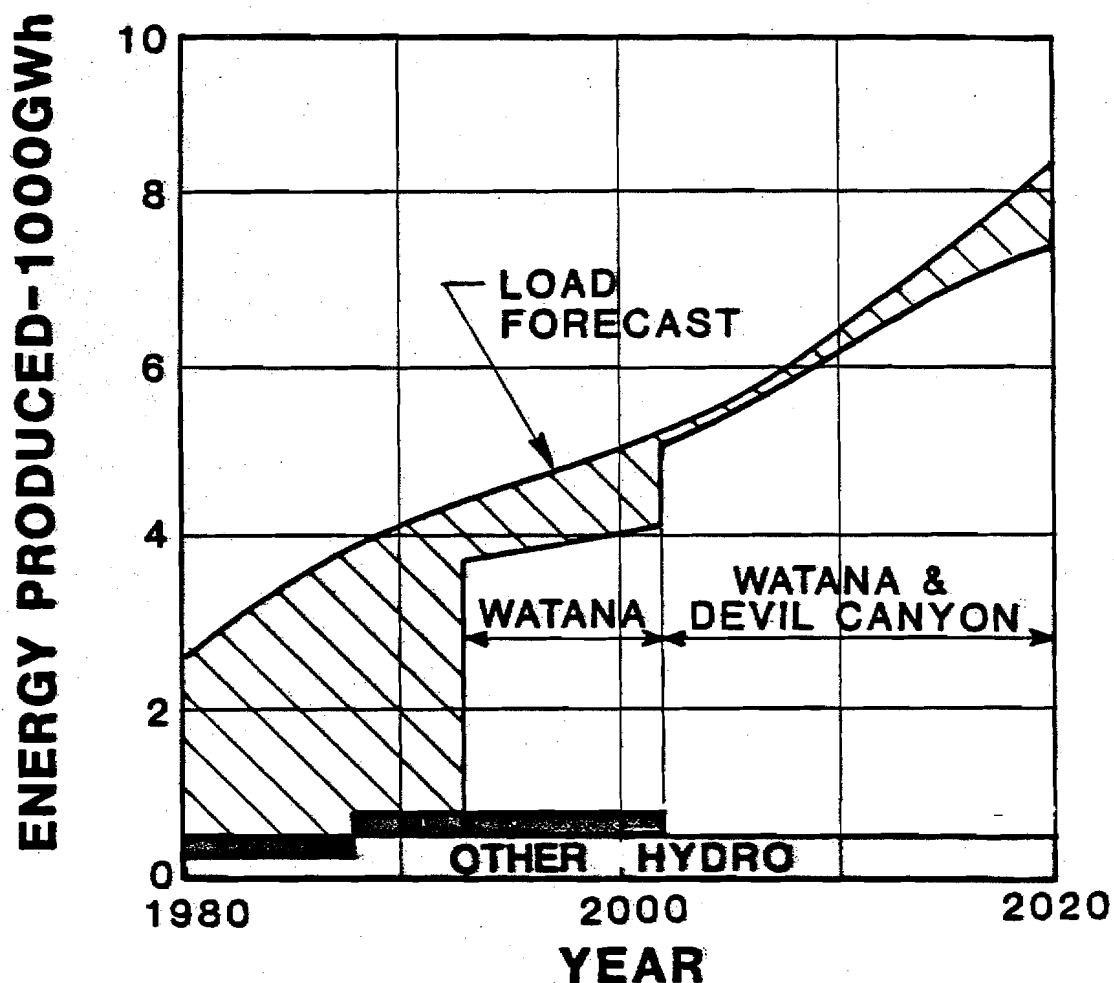
COMPARISON OF CAPACITY BY ALTERNATIVE

	<u>SUSITNA ALT.</u>	<u>NON SUSITNA ALT.</u>
<u>EXIST. CAPACITY:</u> (1984)	1097 MW	1097 MW
<u>RETIREMENTS:</u> (TO 2020)	1302 MW	1386 MW
ADDITIONS:		
<u>HYDRO:</u>	1717 MW	97 MW
<u>COAL:</u>	0 MW	1400 MW
<u>GAS TURBINE:</u>	1077 MW	1230 MW
<u>CAPACITY:</u> (2020)	2589 MW	2438 MW
<u>LOAD:</u>	1724 MW	1724 MW
<u>EXCESS %</u>	50%	41%

COMPARISON OF CAPACITY / DEMAND BY ALTERNATIVE



SUSITNA ALTERNATIVE-ENERGY DEMAND & DELIVERIES



LEGEND

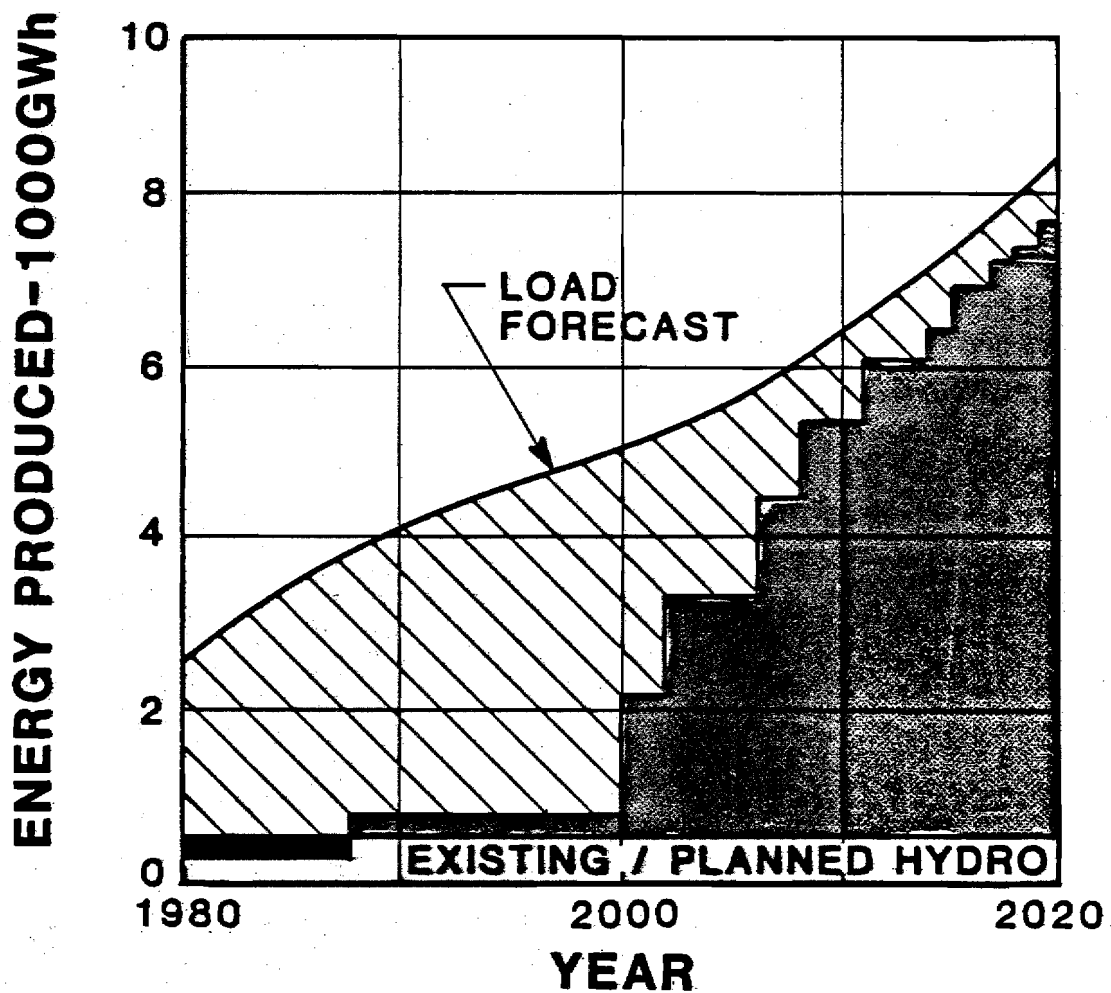


COAL-FIRED



OIL & GAS-FIRED

NON-SUSITNA ALTERNATIVE-ENERGY DEMAND & DELIVERIES



LEGEND



COAL-FIRED



OIL & GAS-FIRED

ECONOMIC FEASIBILITY CONCLUSIONS

(TO YEAR 2050)

	WITH SUSITNA	WITHOUT SUSITNA^①
PRESENT WORTH COST	\$5.7 BILLION	\$6.8 BILLION
COST SAVINGS	\$1.1 BILLION^②	

**- NON - SUSITNA HYDROELECTRIC WITH THERMAL SUPPLEMENT -
\$7.04 BILLION (BRADLEY, GRANT, CHAKACHAMNA, KEETNA,
SNOW PLUS GAS AND COAL)**

① THERMAL (GAS AND COAL) WITH BRADLEY AND GRANT HYDRO

**② POTENTIAL SUSITNA DESIGN REFINEMENTS COULD INCREASE
COST SAVINGS TO \$1.5 BILLION**

SENSITIVITY ANALYSES

**OBJECTIVE: DETERMINE THE SENSITIVITY OF THE RESULTS
OF ECONOMIC ANALYSIS TO ASSUMED CHANGES
IN ONE OR MORE KEY VARIABLES.**

SENSITIVITY ANALYSES

KEY VARIABLE	CHANGE IN SAVINGS ^① (MILLIONS)
AVAILABILITY OF COOK INLET GAS - IF UNLIMITED	- \$281
REAL ESCALATION OF FUEL COSTS - COAL AT 0% 1983-2050	- \$950
- ALL FUELS AT 0% 2020-2050	- \$120
UTILITIES LOAD FORECAST - USED THROUGH 2000	+ \$1900
^① BASE CASE SAVINGS	\$1060 MILLION

THRESHOLD VALUES

**THRESHOLD VALUE IS VALUE OF KEY VARIABLE
AT WHICH COST OF SUSITNA PLAN EQUALS COST
OF NON-SUSITNA PLAN**

THRESHOLD VALUES

<u>KEY VARIABLE</u>	<u>THRESHOLD VALUE</u>
OIL PRICE FORECAST	\$ 27.45/BARREL IN 1999 1.5% ESCALATION THEREAFTER
CONSTRUCTION COST	33% INCREASE
REAL DISCOUNT RATE	5.3%

ENVIRONMENTAL UPDATE

- **ISSUE IDENTIFICATION**

- **STATUS OF ENVIRONMENTAL PROGRAMS**

- **REMAINING ISSUES**

ISSUE IDENTIFICATION

- **FEASIBILITY HEARINGS**
- **REVIEW OF APPLICATION**
- **FERC SCOPING MEETINGS**
- **BOARD MEETINGS**
- **AGENCY WORKSHOPS**

STATUS OF ENVIRONMENTAL PROGRAMS

- **FISHERIES AND HYDROLOGY**
- **WILDLIFE AND VEGETATION**
- **CULTURAL RESOURCES**
- **SOCIOECONOMICS**
- **RECREATION**
- **LAND USE**

FISHERIES AND HYDROLOGY

- **POPULATIONS AND DISTRIBUTION OF FISH**

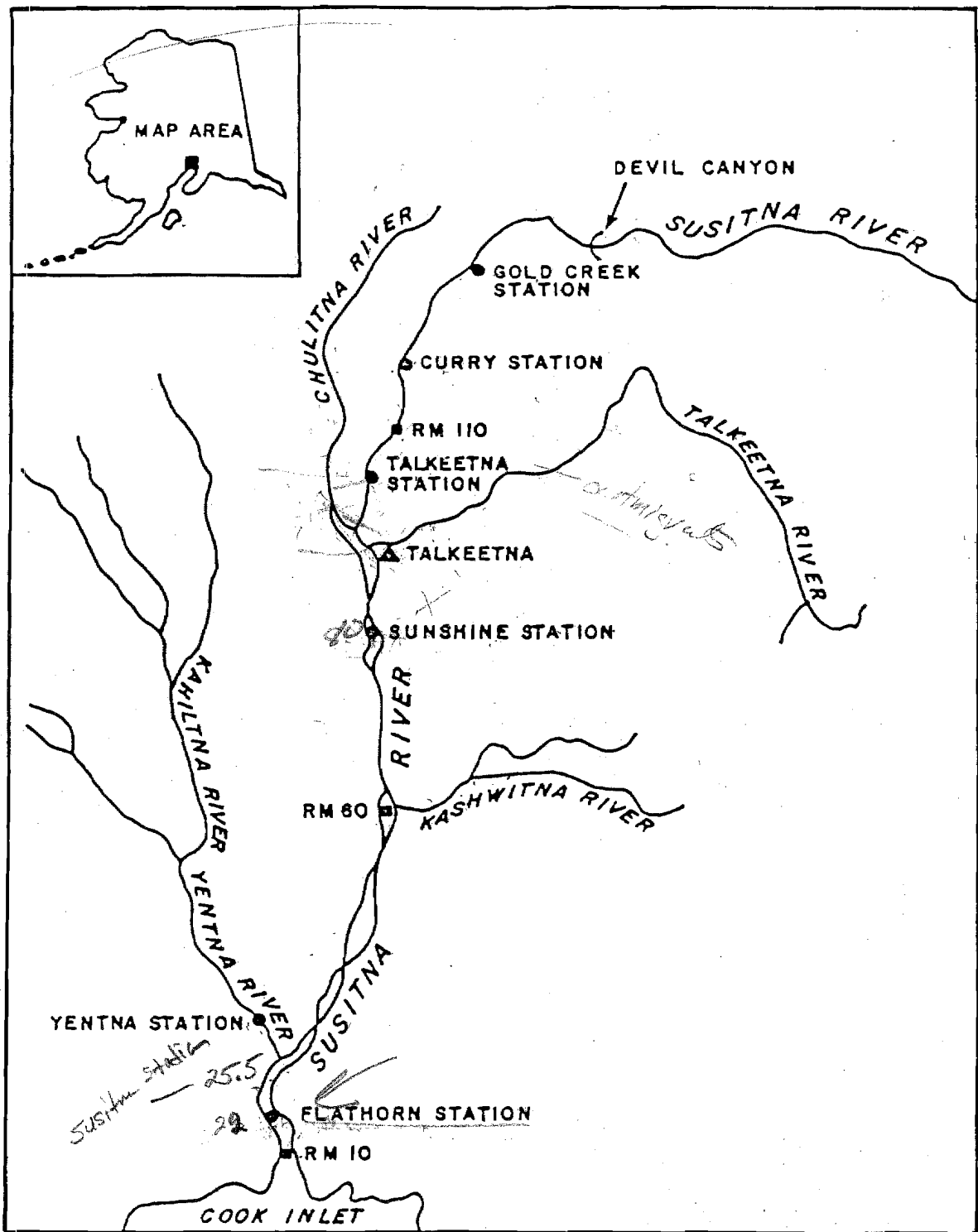
- **CHANGES IN AQUATIC HABITAT**

FLOW PATTERN

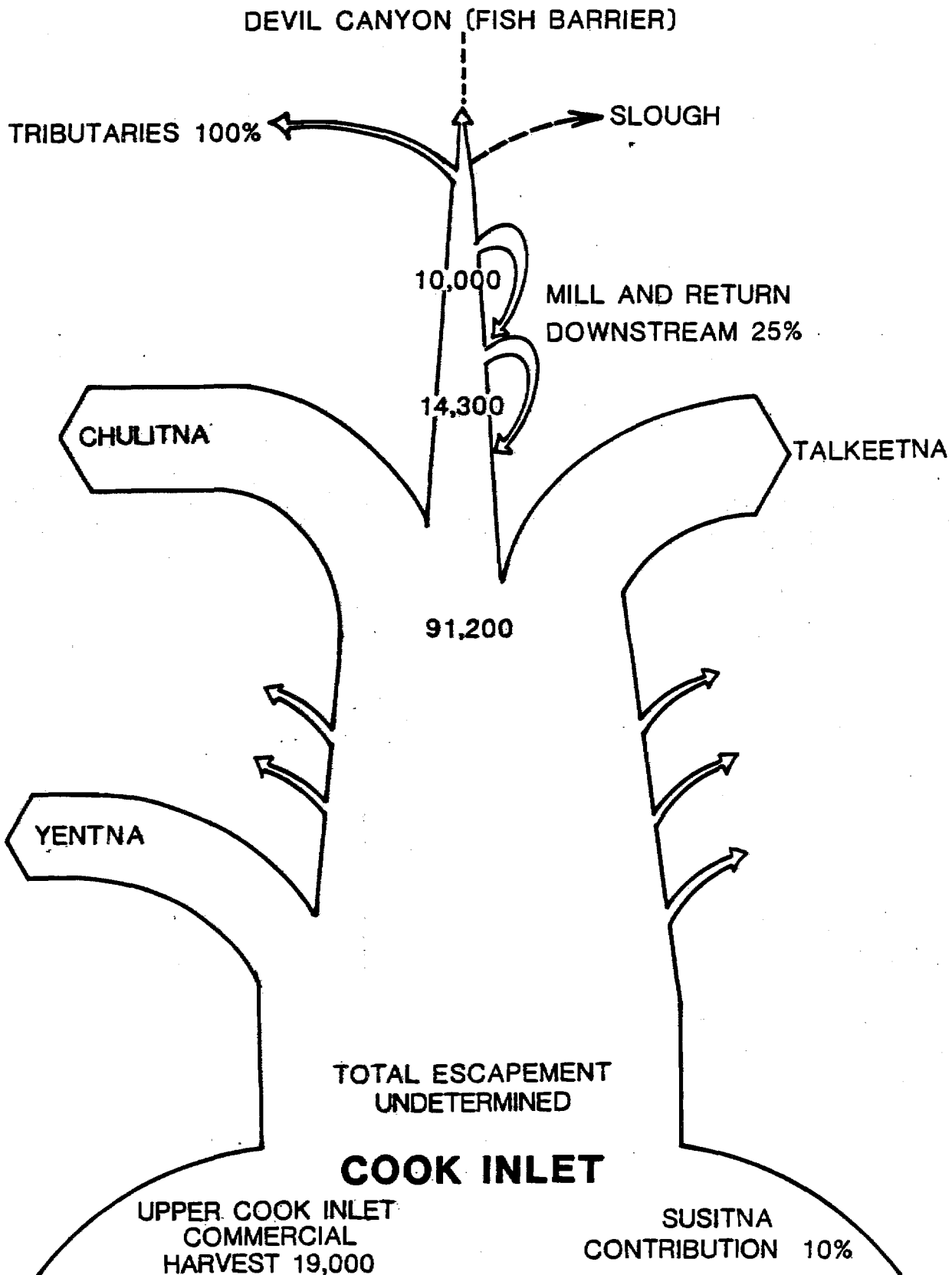
WATER QUALITY

- **PROJECT EFFECTS ON NAVIGATION**

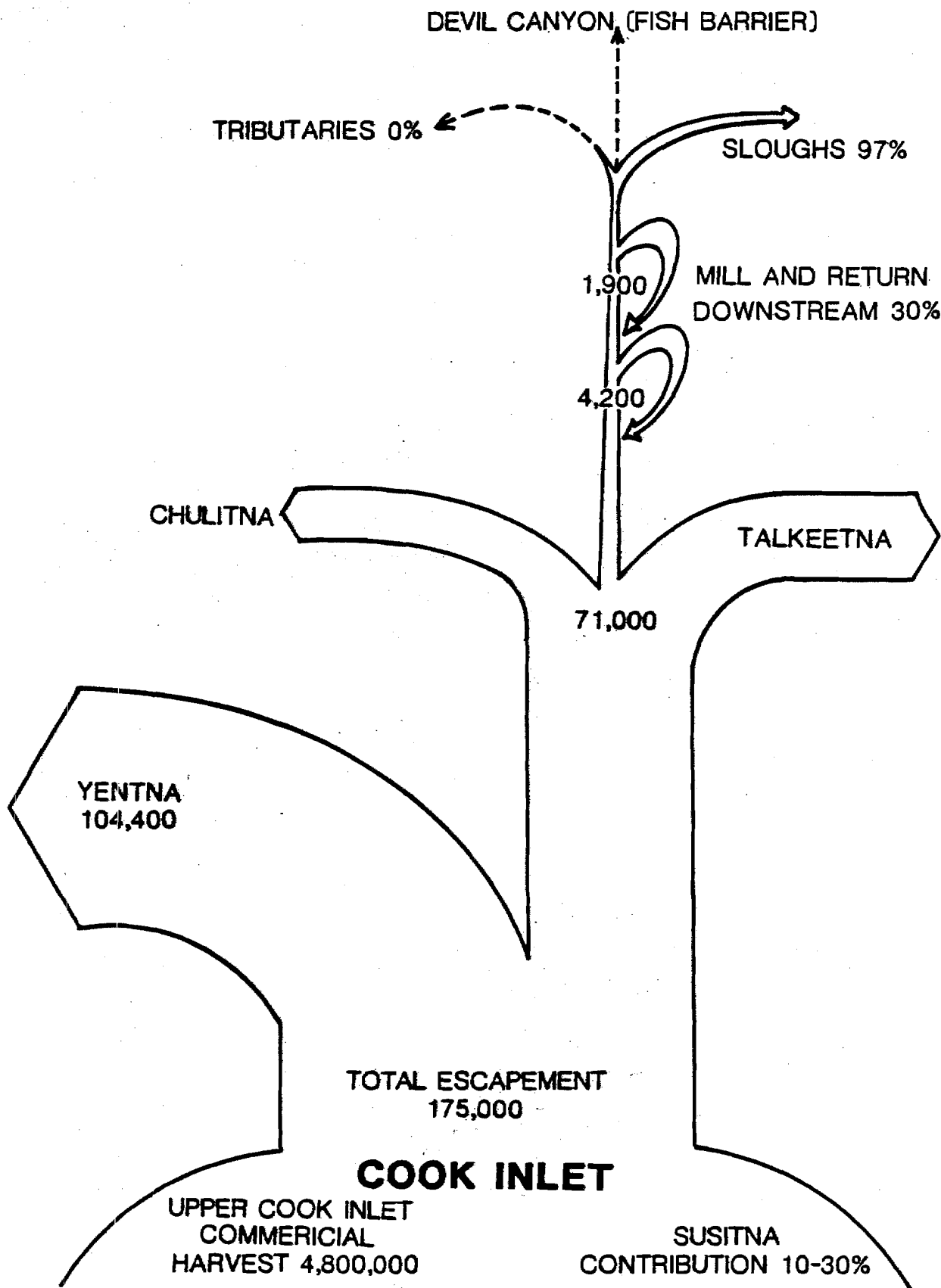
- **DEVELOPMENT OF MITIGATION PLAN**



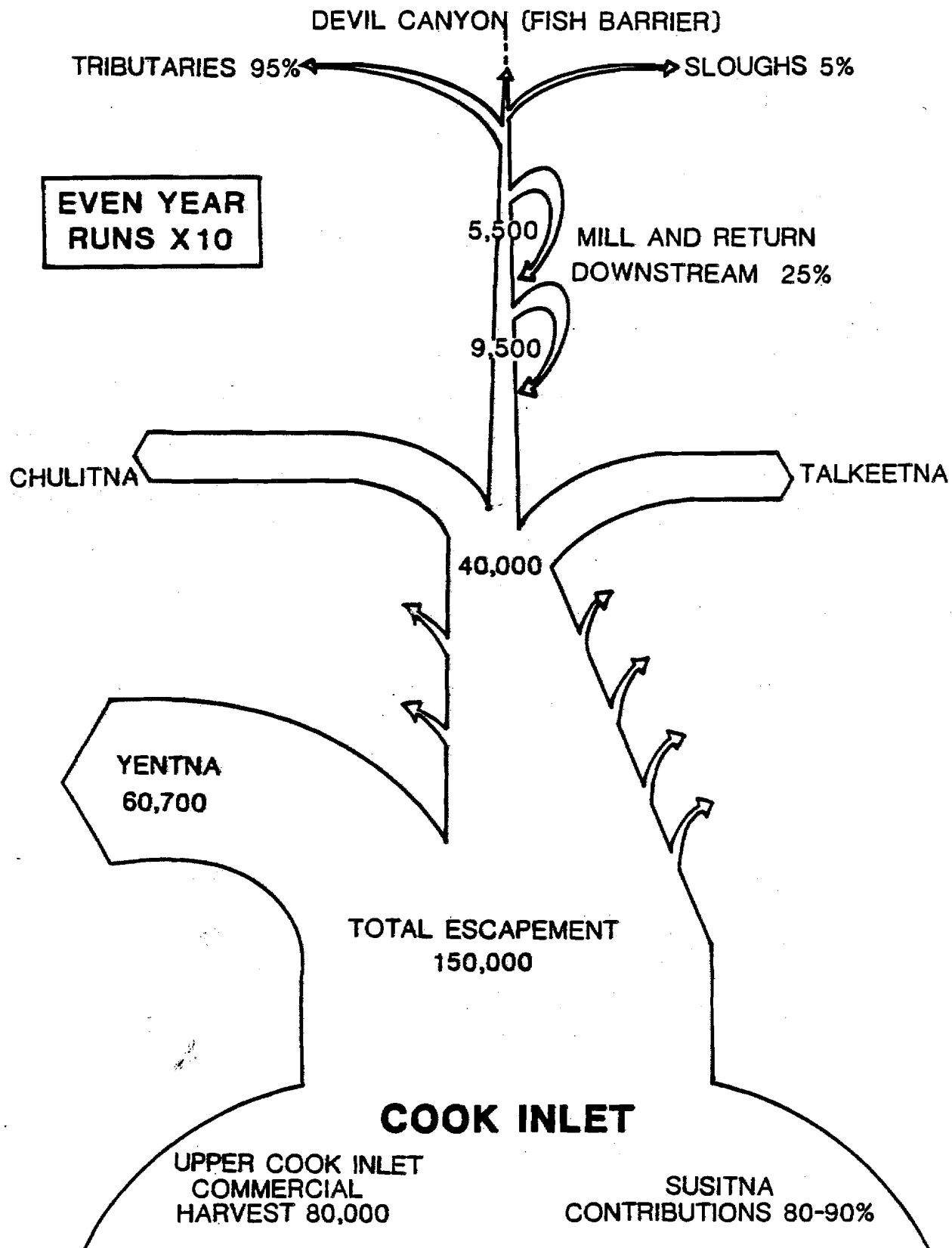
1983 SUSITNA CHINOOK



1983 SUSITNA SOCKEYE



1983 SUSITNA PINKS



1983 COHO

DEVIL CANYON (FISH BARRIER)

TRIBUTARIES 98%

SLOUGHS

800

MILL AND RETURN
DOWNSTREAM 40%

2,400

CHULITNA

TALKEETNA

15,200

YENTNA
8,900

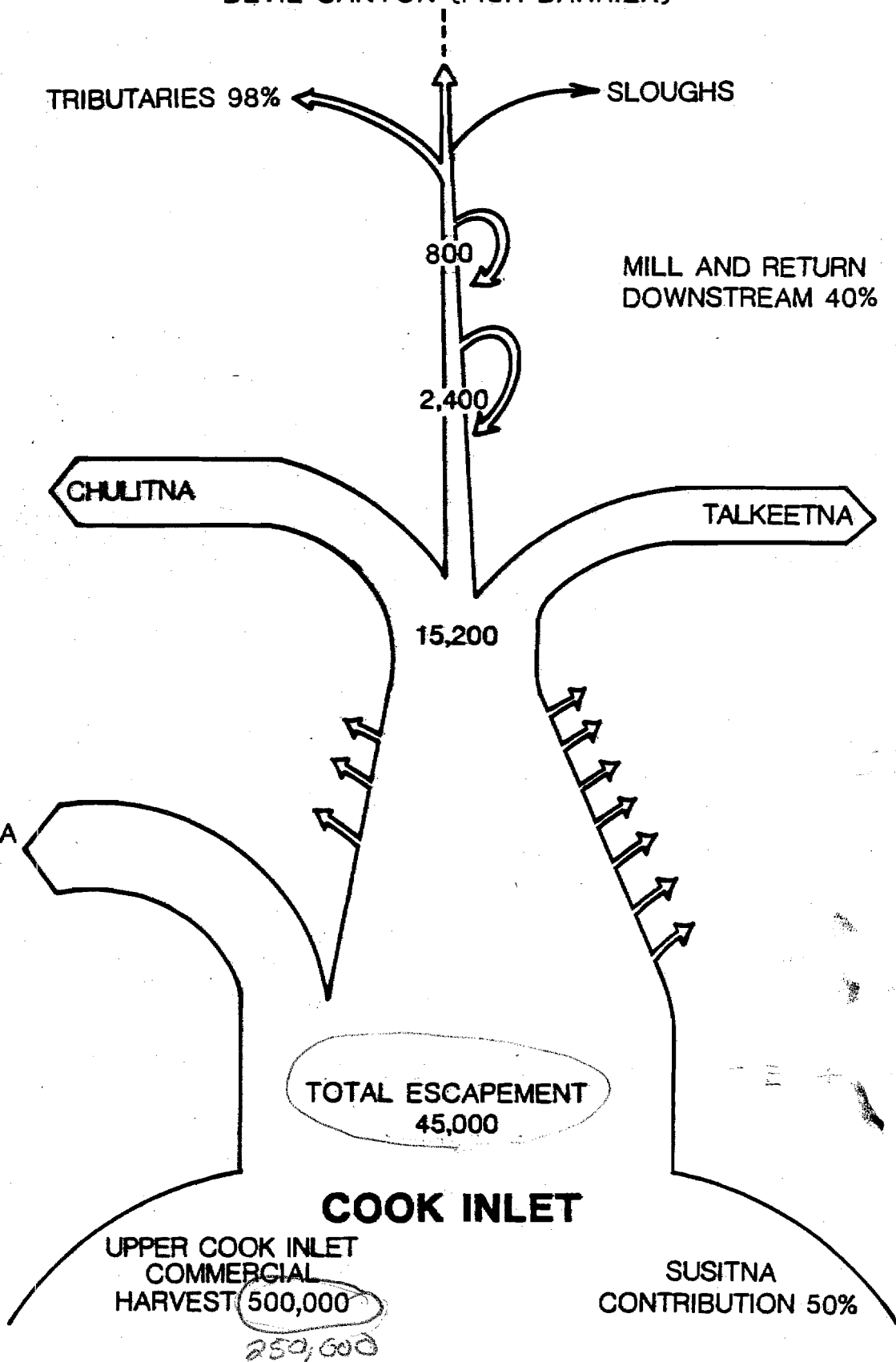
TOTAL ESCAPEMENT
45,000

COOK INLET

UPPER COOK INLET
COMMERCIAL
HARVEST 500,000

259,600

SUSITNA
CONTRIBUTION 50%



1983 SUSITNA CHUM

DEVIL CANYON (FISH BARRIER)

MAINSTEM 13%

TRIBUTARIES 43%

SLOUGHS 44%

21,000

MILL AND RETURN
DOWNSTREAM 40%

CHULITNA

50,400

TALKEETNA

266,000

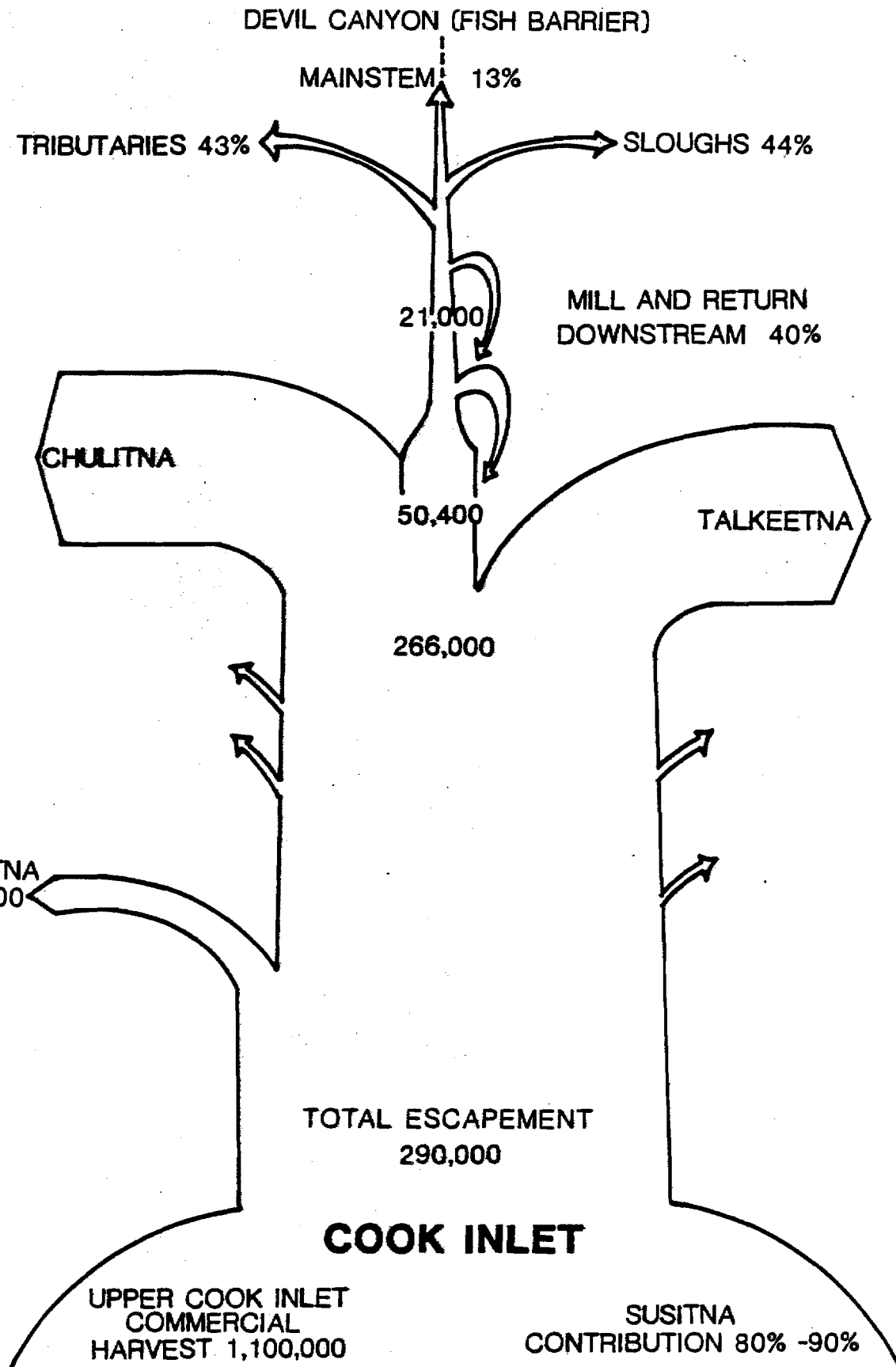
YENTNA
10,800

TOTAL ESCAPEMENT
290,000

COOK INLET

UPPER COOK INLET
COMMERCIAL
HARVEST 1,100,000

SUSITNA
CONTRIBUTION 80% -90%



HABITAT TYPES/ LIFE STAGES

HABITAT TYPES

- **MAINSTEM**
- **SIDE CHANNEL**
- **TRIBUTARIES**
- **SLOUGHS**

LIFE STAGES

- **ADULT ACCESS AND SPAWNING**
- **EGG INCUBATION**
- **JUVENILE REARING**

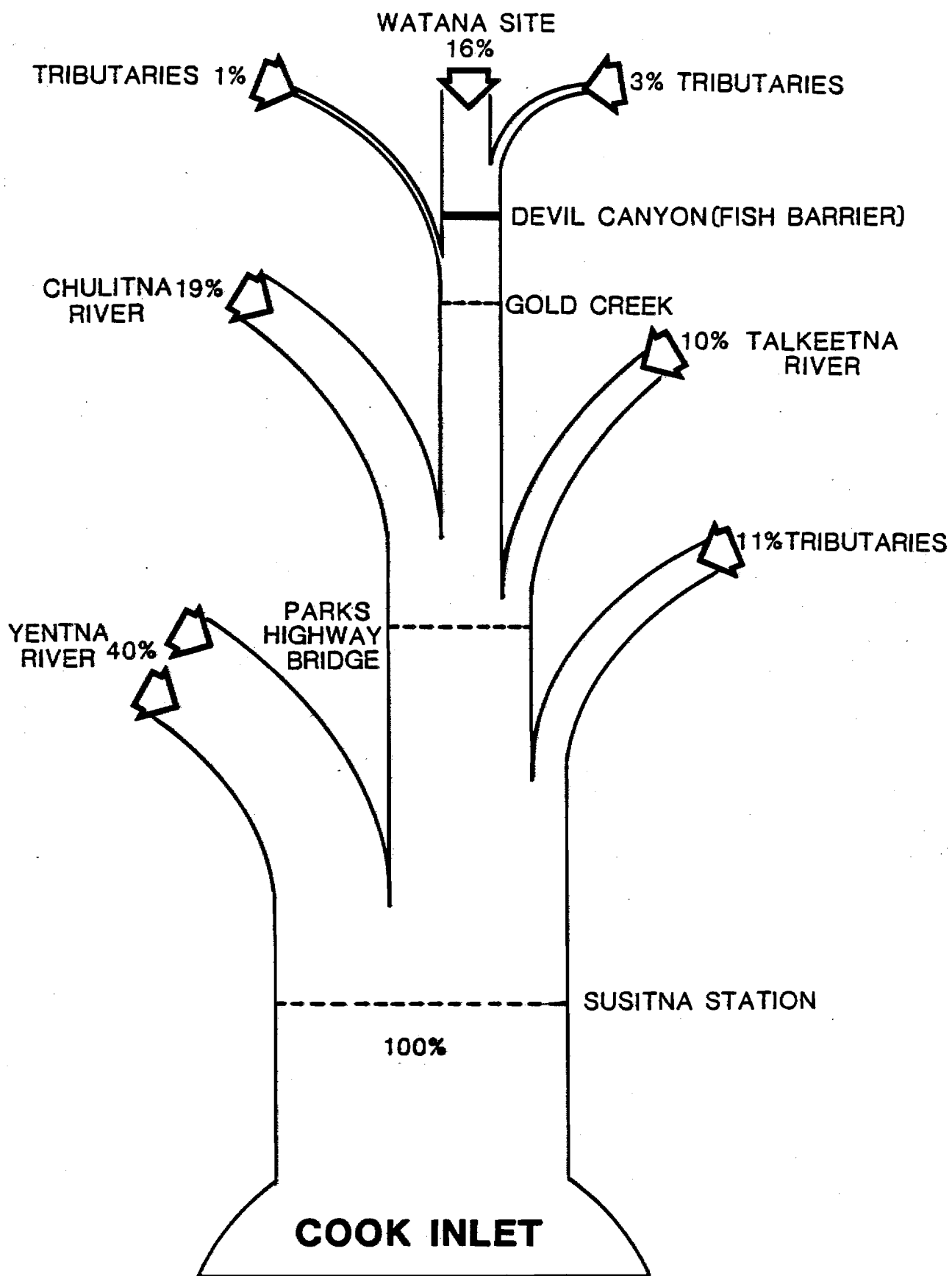
SPAWNING HABITAT PREFERENCES BY SUSITNA RIVER SALMON

<u>SPECIES</u>	<u>PREDOMINANT SPAWNING HABITAT</u>
PINK	TRIBUTARIES
CHUM	SLOUGHS AND TRIBUTARIES
SOCKEYE	SLOUGHS (IN MIDDLE REACH)
COHO	TRIBUTARIES
CHINOOK	TRIBUTARIES

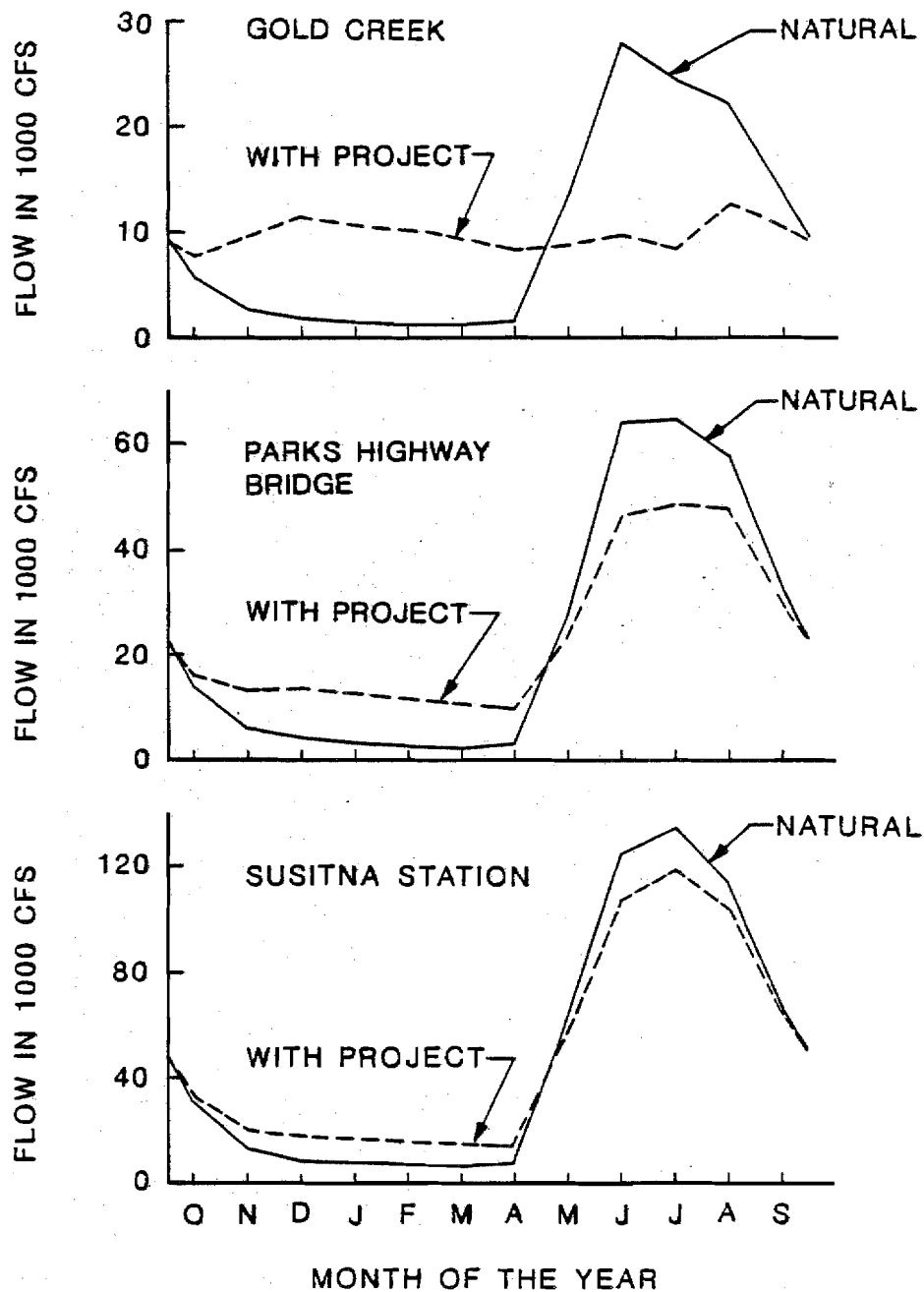
PROJECT CHANGES IN AQUATIC HABITAT

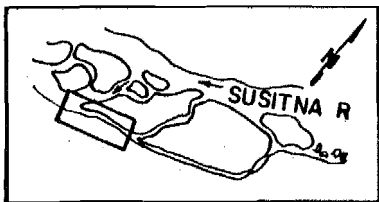
- **CHANGES IN FLOW PATTERNS
DISCHARGE/STAGE RELATIONSHIP**
- **ACCESS TO SPAWNING AREAS
SLOUGHS
TRIBUTARIES**
- **CHANGES IN AQUATIC HABITAT
CHARACTERISTICS AND USE**

CONTRIBUTION TO SUSITNA RIVER FLOW



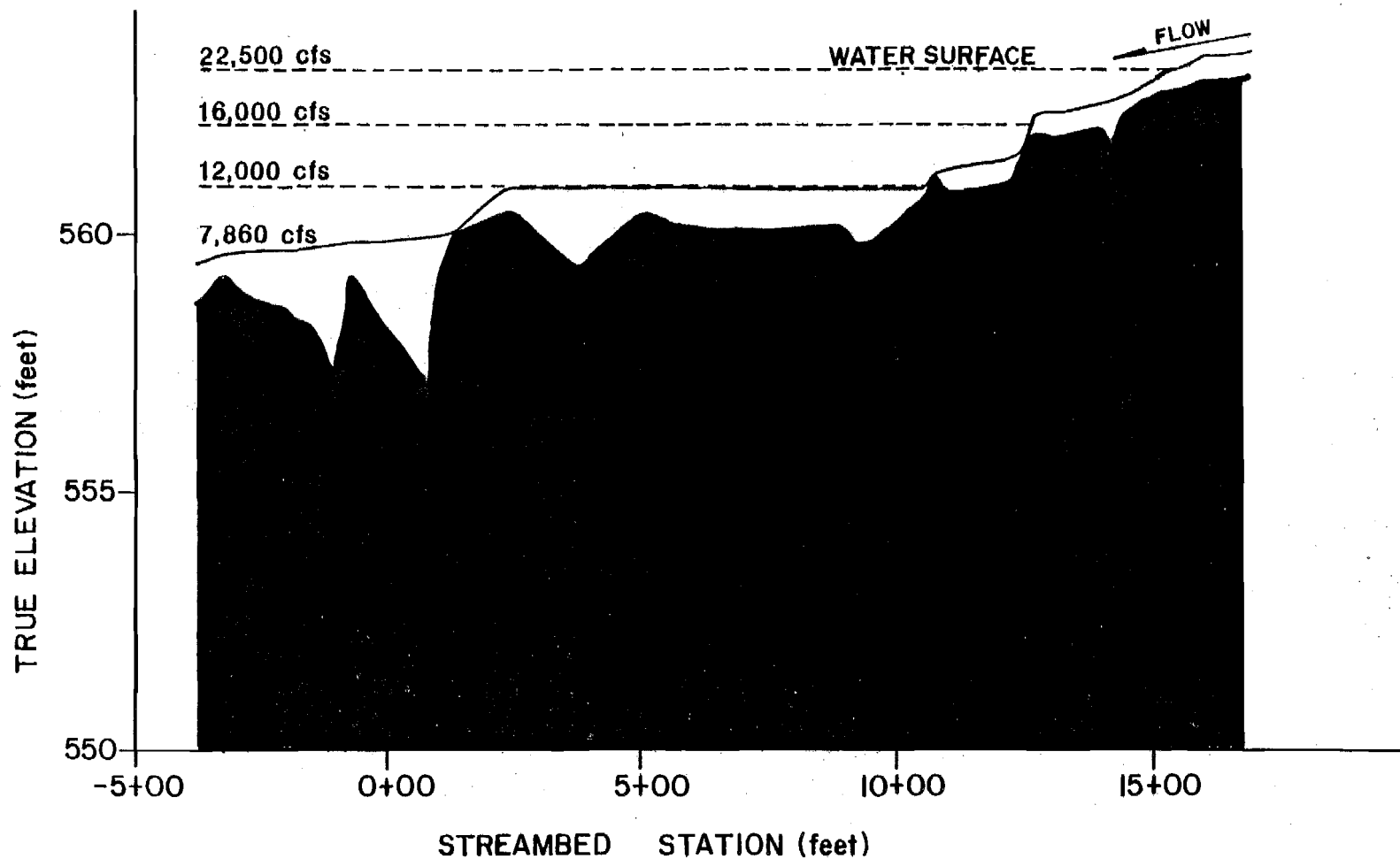
MONTHLY MEAN SUSITNA RIVER FLOWS





THALWEG PROFILE

SLOUGH 8A



PEAK ESCAPEMENT

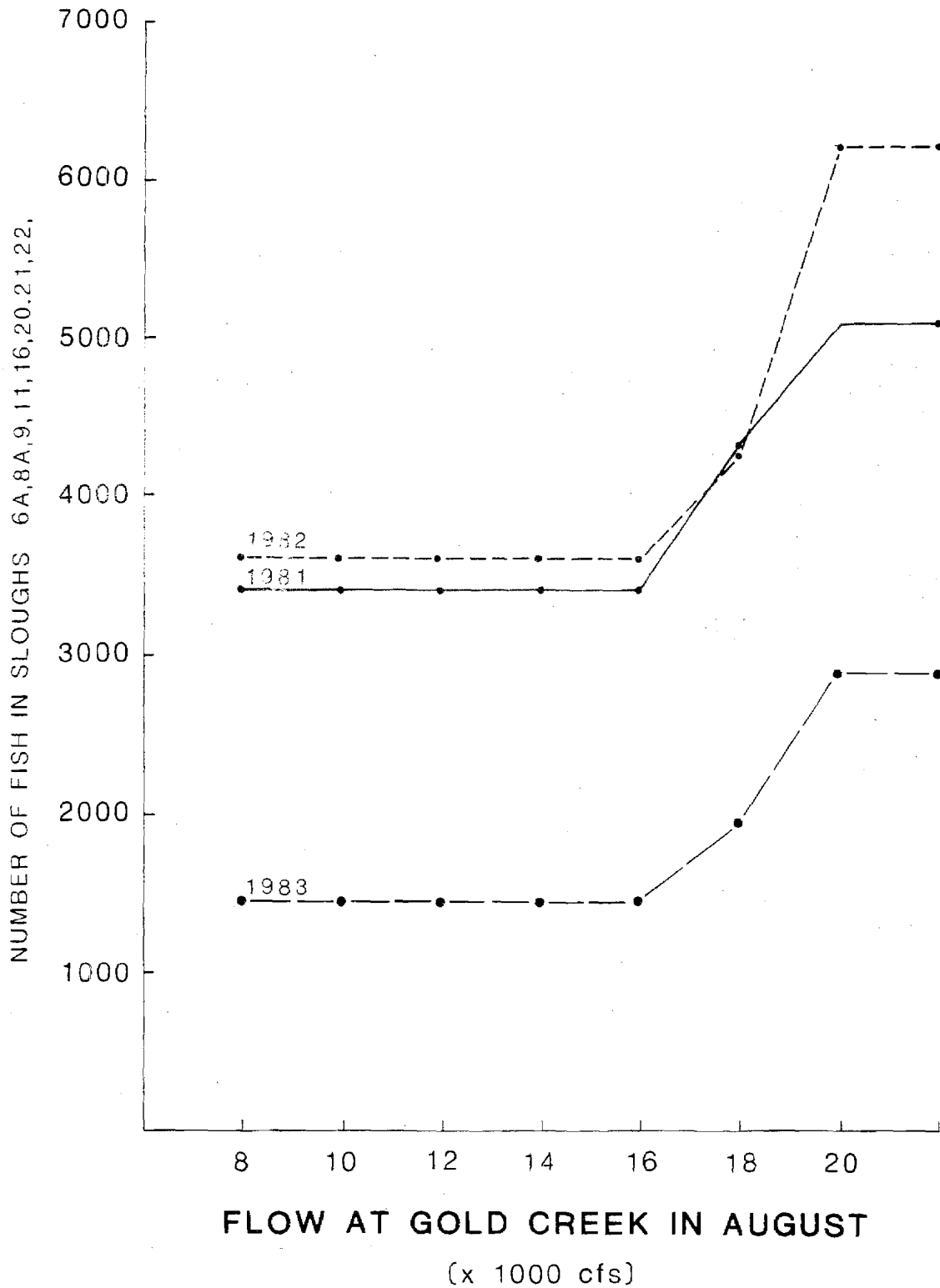
SLOUGH	ACCESS	SOCKEYE	PINK	CHUM
	ACUTE	81	81	81
	UNRESTRICTED	82	82	82
		83	83	83
WHISKERS	8,000	0	-	0
	10,000	0	138	0
		0	0	0
6A	---	0	-	11
	8,000	0	35	2
		0	0	6
8A	7,860	117	-	411
	12,500	68	28	459
		66	0	238
9	18,000	6	-	260
	20,000	10	12	300
		2	0	169
11	---	214	-	411
	6,700	893	131	459
		248	7	238
16B	18,000	0	0	0
	24,000	0	0	0
		0	0	0
20	20,000	2	-	14
	21,500	0	64	30
		0	7	63
21	20,000	38	-	274
	23,000	53	64	736
		197	1	319
22	20,000	0	-	0
	22,500	0	0	0
		0	0	114

**HABITAT SELECTION AND REARING
BY
SUSITNA RIVER
JUVENILE SALMON**

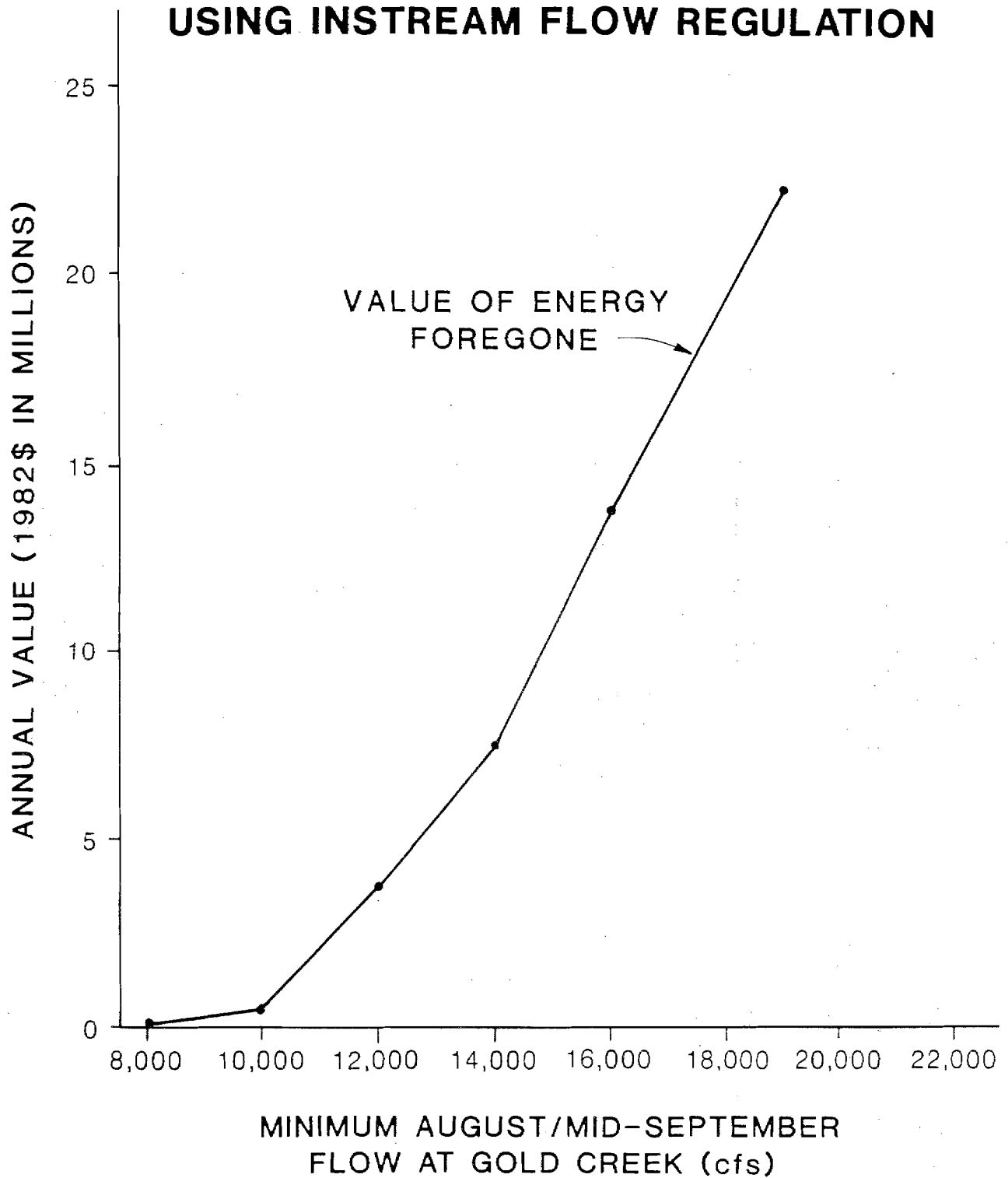
<u>SPECIES</u>	<u>PREDOMINANT REARING HABITAT</u>	<u>FRESHWATER REARING PERIOD</u>
PINK	NONE	NONE
CHUM	SLOUGHS	UP TO 3 MONTHS
SOCKEYE *	UPLAND SLOUGHS	ONE YEAR
COHO *	UPLAND SLOUGHS/SMALL TRIBUTARIES	ONE TO TWO YEARS
CHINOOK *	SIDE-CHANNELS AND TRIBUTARIES	ONE YEAR

* OVER WINTER IN MAINSTEM

TOTAL NUMBER OF SLOUGHS SPAWNING SALMON



MAINTAINING SLOUGH PRODUCTION USING INSTREAM FLOW REGULATION



WATER QUALITY

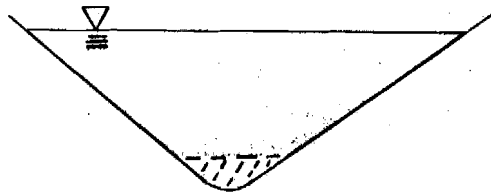
◦ **TEMPERATURE**

MAINSTEM

ICE FORMATION AND BREAKUP

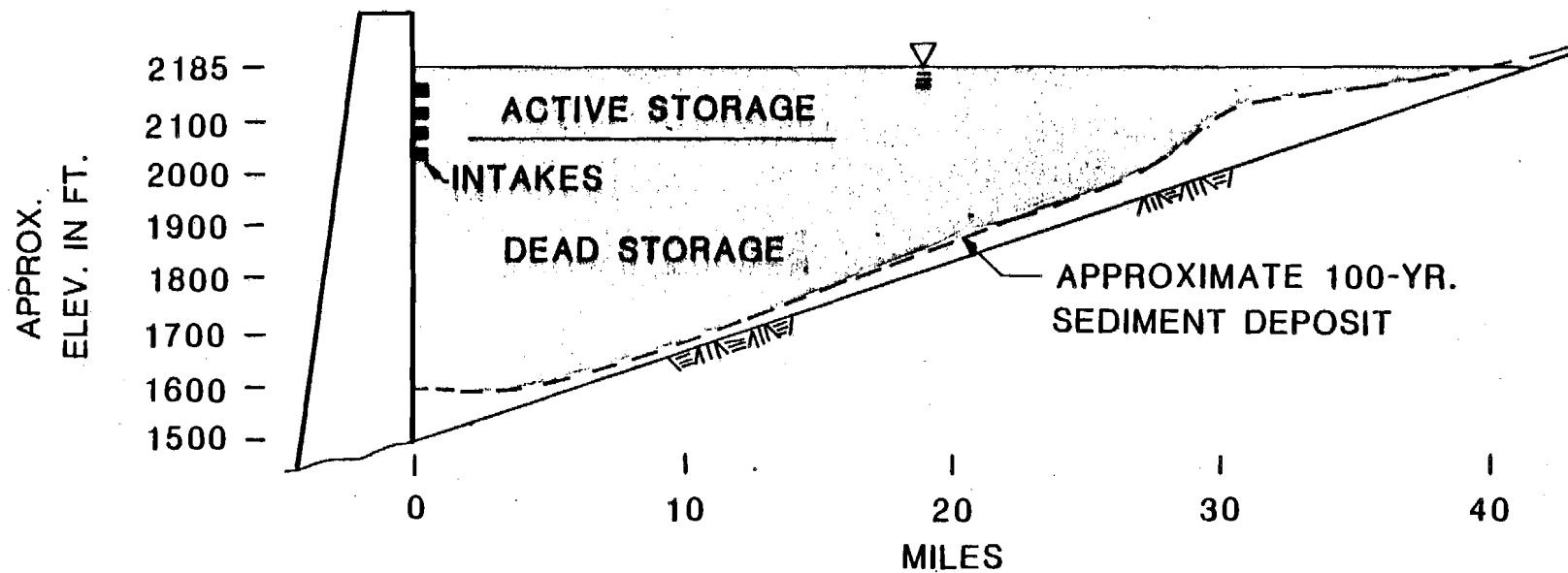
◦ **SEDIMENT**

AMOUNT OF RESERVOIR FILL-IN IN 100YRS. - WATANA



AREA CONTAINED BELOW DASHED LINE INDICATES
APPROXIMATE VOLUME AND LOCATION OF SEDIMENT
AFTER 100 YEARS

4 PERCENT OF VOLUME FILLED WITH SEDIMENT
IN 100 YEARS



NAVIGATION

- **EXISTING CONDITIONS**
- **WITH-PROJECT CHANGES**

FREQUENCY OF NON-NAVIGABILITY OF DEVIL CANYON - TALKEETNA REACH RESULTING FROM LOW FLOW CONDITIONS

PERCENT OF TIME FLOW LESS THAN 6,500 cfs

MONTH	NATURAL CONDITIONS		WATANA ALONE	WATANA - DEVIL CANYON
MAY	31.0	10	10	10
JUNE	0	0	3	10
JULY	0	0	0	0
AUGUST	1.5	0	0	0
SEPTEMBER	8.6	5	0	0

FISHERIES AND HYDROLOGY CONCLUSIONS

- 1. NO ANADROMOUS FISH ABOVE DEVIL CANYON**
- 2. ONLY A SMALL PERCENTAGE OF SUSITNA
RIVER FISH USE MIDDLE RIVER REACH**
- 3. OF FISH USING MIDDLE RIVER REACH, MOST
ENTER TRIBUTARIES**
- 4. SEVERAL THOUSAND SOCKEYE AND CHUM SPAWN
IN SLOUGHS AFFECTED BY PROJECT FLOWS**

FISHERIES AND HYDROLOGY CONCLUSIONS

- 5. JUVENILES REAR IN AREAS AFFECTED
BY PROJECT FLOWS**
- 6. CHINOOK JUVENILES REAR IN SIDE CHANNELS
AND TURBID SLOUGHS**
- 7. MINIMAL EFFECTS ON BOAT TRANSPORTATION**
- 8. POTENTIAL FOR DELAY IN FORMATION OF RIVER
ICE AND FOR ICE FRONT TO BE DOWNSTREAM OF
DEVIL CANYON**

FISHERIES AND HYDROLOGY CONCLUSION

9. LESS MIDDLE RIVER EROSION

- RIVER BED ARMORED WITH LARGE COBBLES. REGULATED RIVER WILL BE LESS CAPABLE OF MOVING BED MATERIAL.**
- BANK EROSION A FUNCTION OF FLOOD STAGE AND ICE JAMS. PROJECT WILL REDUCE FREQUENCY AND SEVERITY OF EACH.**

FISHERIES AND HYDROLOGY CONCLUSION

10. LOWER RIVER SEDIMENT DEPOSITION

- **CHULITNA CONTRIBUTES MOST LOWER RIVER SEDIMENT LOAD. REDUCING SUSITNA PEAK FLOWS WILL REDUCE CAPACITY OF RIVER BELOW CONFLUENCE TO REDISTRIBUTE SEDIMENTS.**

WILDLIFE & VEGETATION

- **HABITAT LOSS**
- **MOOSE IMPACTS**
- **CARIBOU IMPACTS**
- **BLACK AND BROWN BEAR IMPACTS**
- **DALL SHEEP LICK**
- **LOSS OF RAPTOR NESTS**
- **DEVELOPMENT OF MITIGATION PLAN**

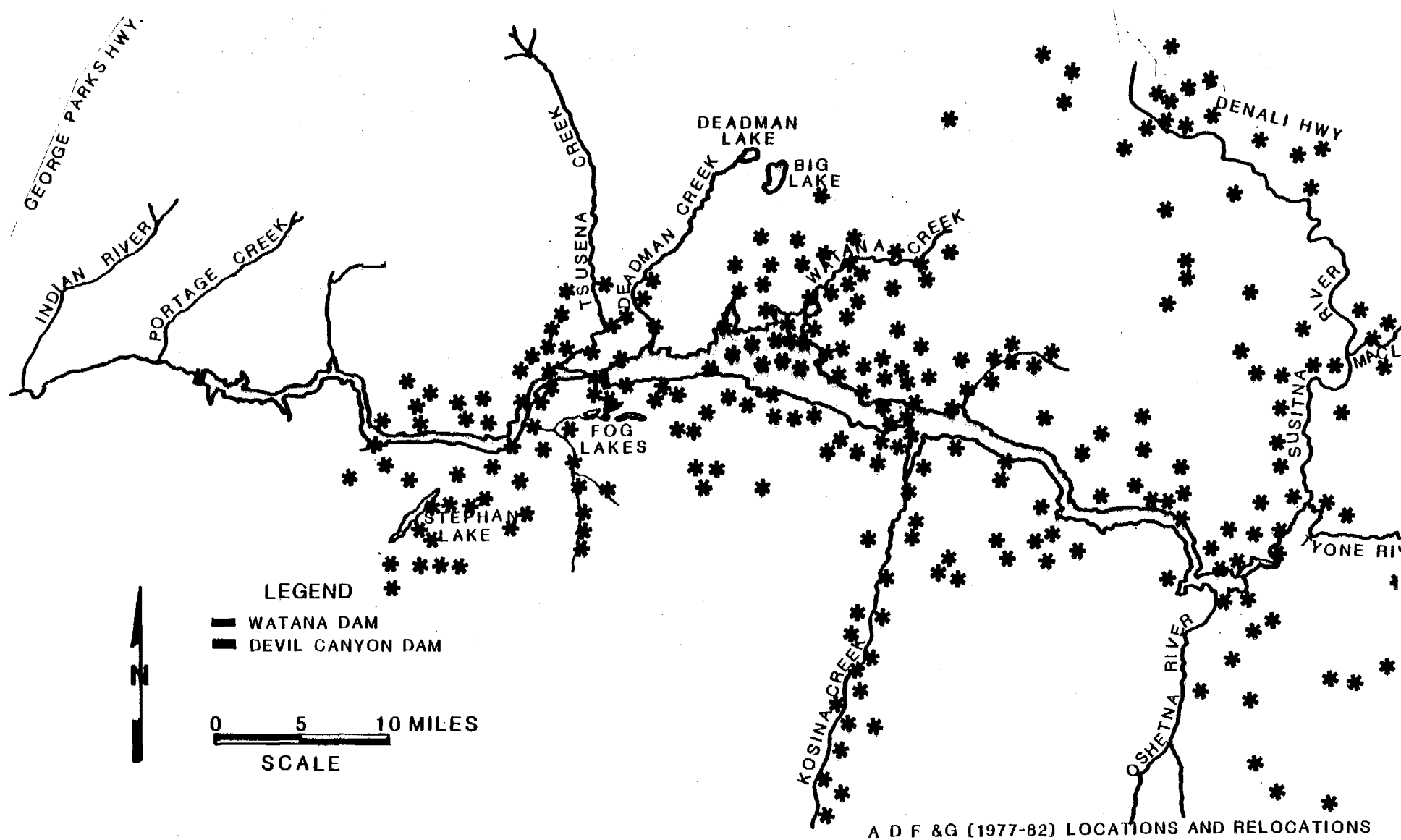
AREA OF HABITAT LOST OR MODIFIED (ACRES)

WATANA RESERVOIR	36,500
DEVIL CANYON RESERVOIR	7,900
PROJECT FACILITIES AND BORROW PITS	4,900
TRANSMISSION CORRIDORS	10,500
ACCESS CORRIDORS	1,100
TOTAL	60,900

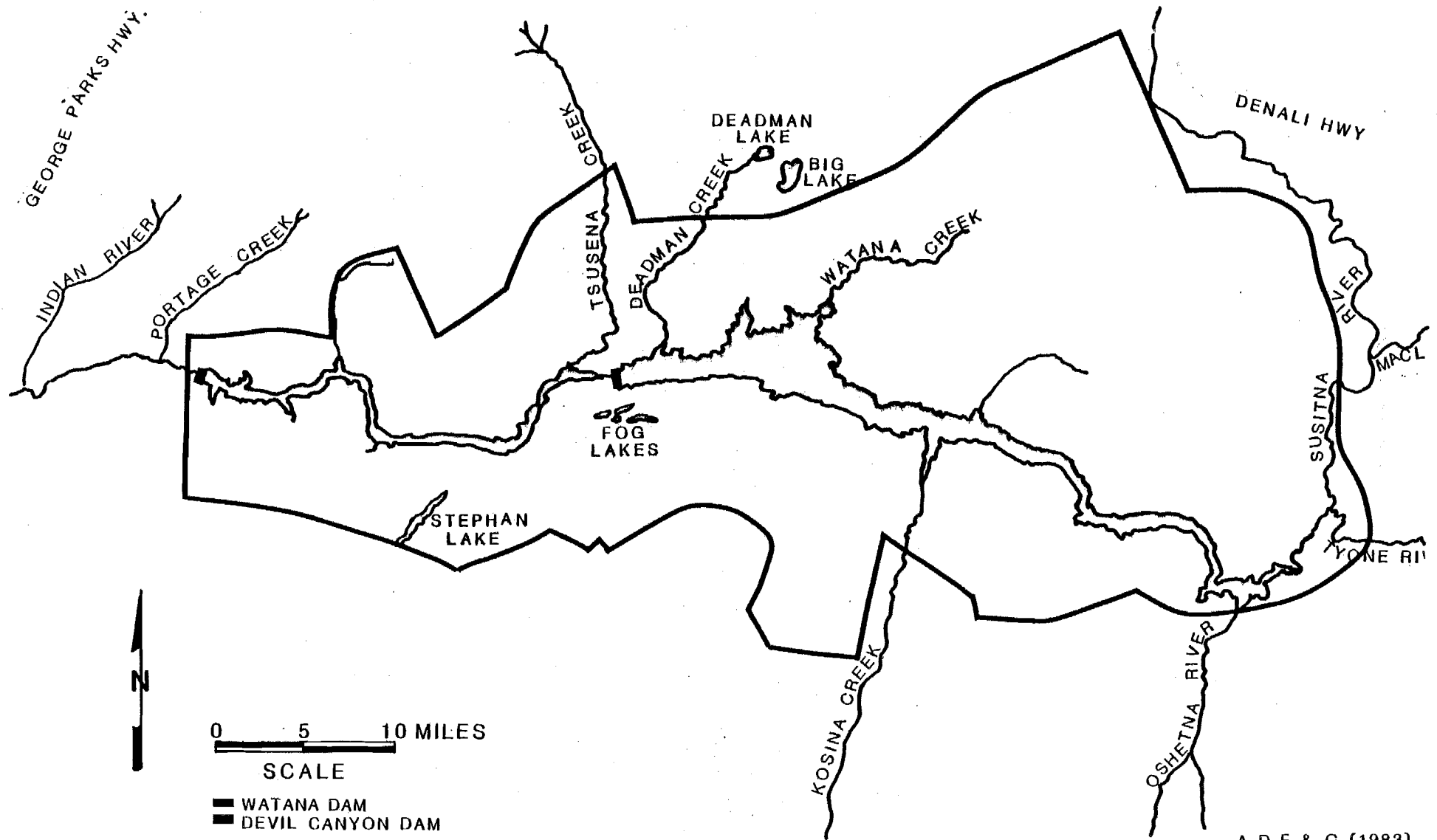
MOOSE IMPACTS

- **POPULATION CENSUS**
- **BROWSE VEGETATION INVENTORY**
- **MONITORING OF PREDATORS**
- **CALF MORTALITY STUDY**
- **COMPUTER MODELING**

WINTER LOCATIONS OF RADIO-COLLARED MOOSE IN PROJECT AREA

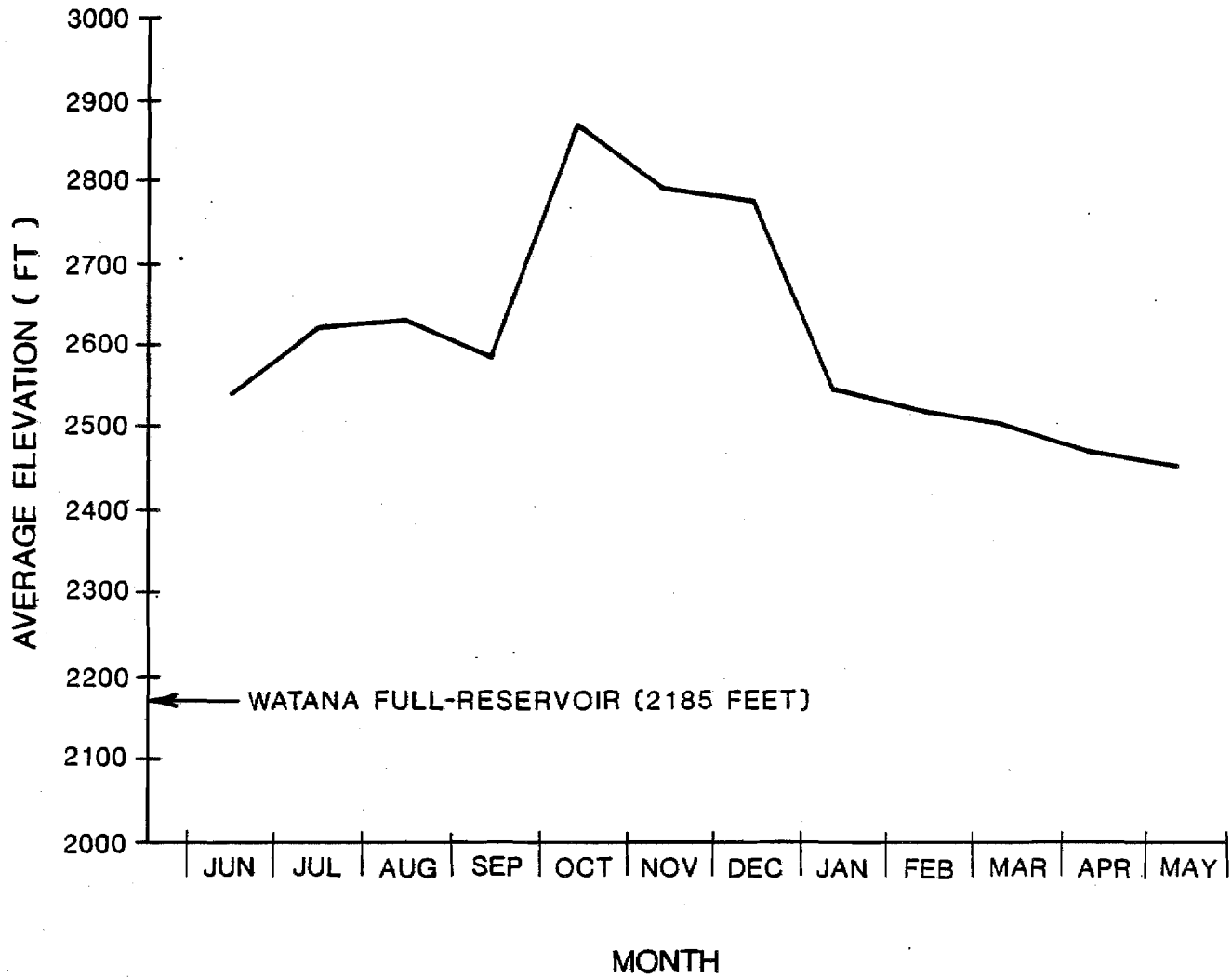


DISTRIBUTION OF MOOSE WITH HOME RANGES OVERLAPPING THE IMPOUNDMENTS



A D F & G (1983)

**AVERAGE ELEVATIONS OCCUPIED BY
MOOSE WITH HOME RANGES
OVERLAPPING THE IMPOUNDMENTS
1976 - 1982**

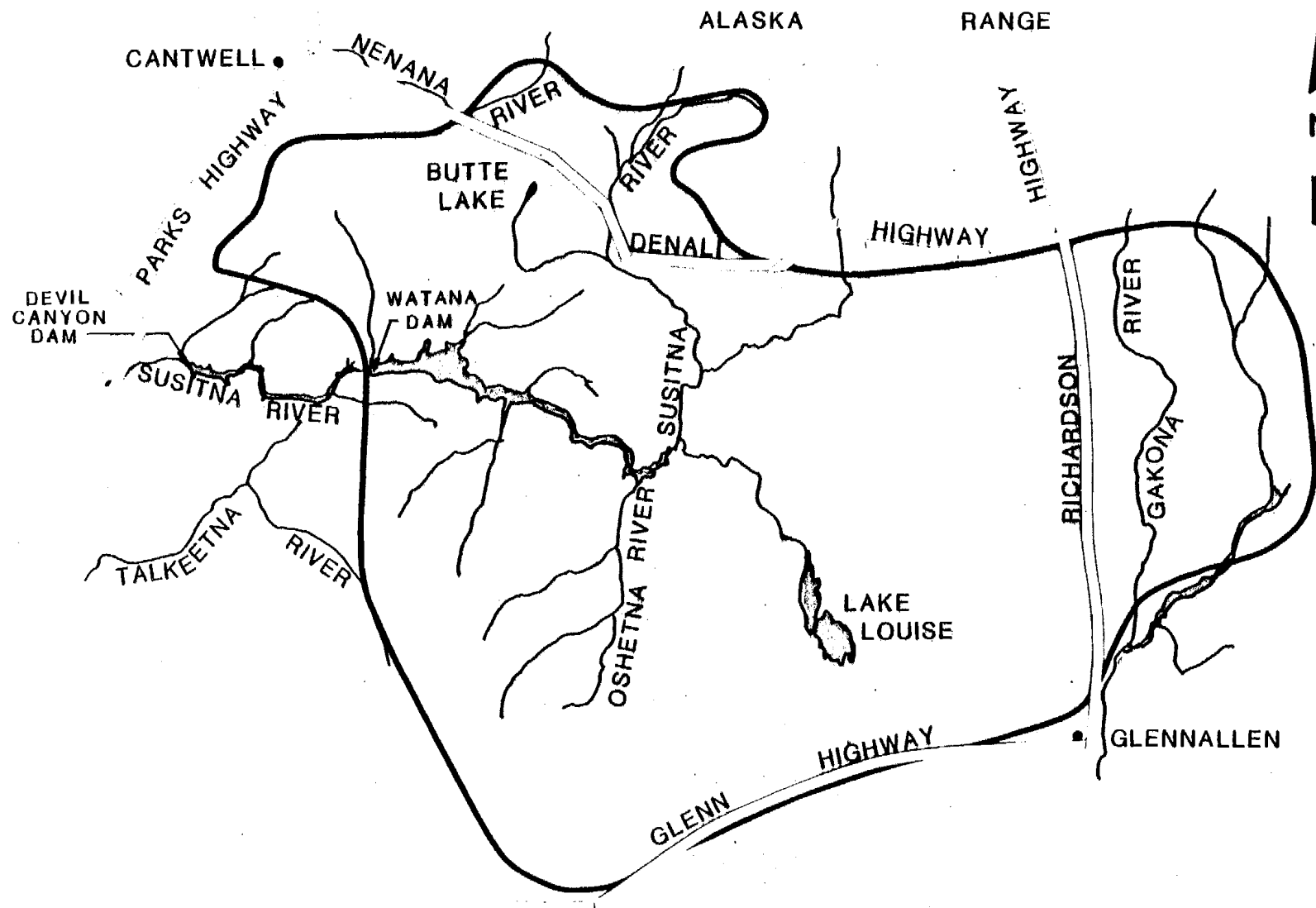


ADF&G

CARIBOU IMPACTS

○ POPULATION CENSUS

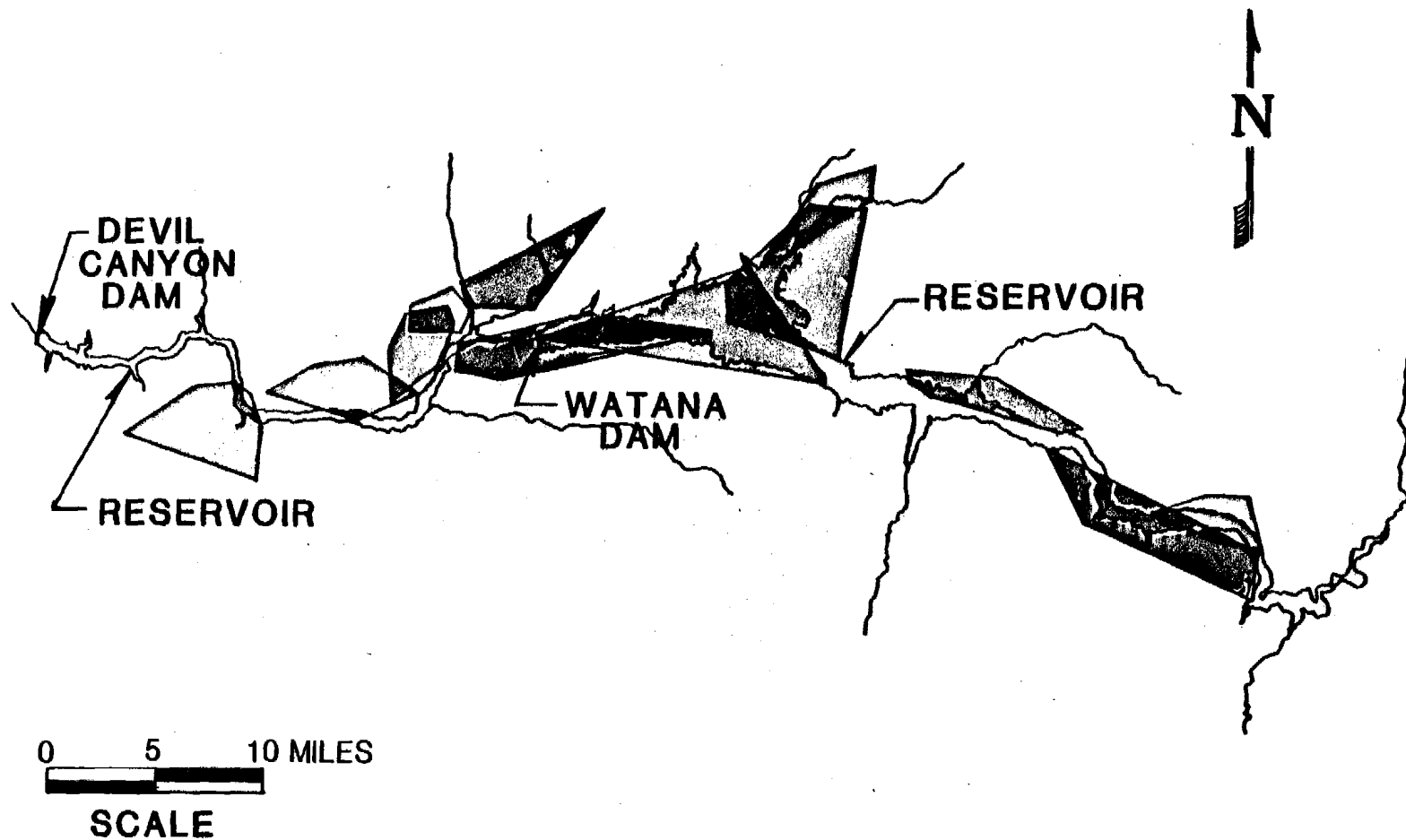
MOVEMENTS OF RADIO-COLLARED CARIBOU



BLACK & BROWN BEAR IMPACTS

○ POPULATION CENSUS

HOME RANGES OF FEMALE BLACK BEARS



A D F & G (1980-83)

CONCLUSIONS - WILDLIFE AND VEGETATION

- **LOSS OF MOOSE HABITAT**
- **LOSS OF BEAR HABITAT**
- **NELCHINA CARIBOU HERD CROSSES IMPOUNDMENT
AREA ON SOME MIGRATIONS**
- **UPPER SUSITNA - NENANA CARIBOU SUBHERD -
RANGE CROSSED BY ACCESS ROAD**
- **2 OR 3 NESTING PAIRS OF BALD EAGLES DISPLACED
TO NEW NEST SITES**

CULTURAL RESOURCES

- **COMPLIANCE WITH NATIONAL HISTORIC PRESERVATION ACT**

DETERMINATION OF RESPONSIBILITIES

IDENTIFICATION OF CULTURAL RESOURCES

DEFINITION OF CRITERIA FOR SIGNIFICANCE

MITIGATION PLAN

CONCLUSION-CULTURAL RESOURCES

- **SITES OR DISTRICT ELIGIBLE FOR REGISTERS**

SOCIOECONOMICS

- **SOCIOECONOMIC IMPACT PROJECTIONS**
- **FISH AND WILDLIFE RESOURCE USERS**
- **ALTERNATIVE WORKERS TRANSPORTATION PLANS**
- **MITIGATION PLAN**

SOCIOECONOMIC IMPACT PROJECTIONS

- **HOUSEHOLD, BUSINESS AND PUBLIC SECTOR SURVEYS**

IN SMALL COMMUNITIES

- **INTERVIEW CONSTRUCTION WORKER SURVEYS**
- **SOCIOECONOMIC IMPACT MODEL**

SOCIO ECONOMIC SURVEYS

FALL 1983

	<u>CANTWELL</u>	<u>TALKEETNA</u>	<u>TRAPPER CREEK</u>
POPULATION	193	281	196
NATIVE	18%	5%	0%
HOUSEHOLD SIZE	2.38	3.16	3.2
CHILDREN	0.6	0.9	0.95
UNEMPLOYMENT OCT. 83	24%	14%	20%
VACANCY OCT.83	36%	28%	11%
ANGLERS	67%	48%	53%
HUNTERS	56%	29%	42%

INTERTIE CONSTRUCTION WORKER SURVEY

VARIABLE	CANTWELL	TALKEETNA	TOTAL
○TOTAL NUMBER OF WORKERS	45	43	88
○PERCENT NONMOVER	6.7	34.9	20.5
○PERCENT MOVER	35.6	48.8	42.0
○PERCENT WEEKLY COMMUTER	57.8	16.3	37.4
○PERCENT UNION	71.0	0.0	36.4
○AVERAGE AGE	35.8	35.7	35.8
○PERCENT OF NONLOCAL WORKERS WITH DEPENDENTS PRESENT	14.3	21.4	17.1
○AVERAGE NUMBER OF DEPENDENTS PRESENT PER NONLOCAL WORKER	0.3	0.5	0.4
○REMAIN IN COMMUNITIES AFTER JOB ENDS	13.3	47.6	29.9

SOCIOECONOMIC IMPACT MODEL

DEMOGRAPHIC ECONOMIC IMPACTS

1990

MAT SU BOROUGH

	WITHOUT-PROJECT	WITH-PROJECT
POPULATION	47,246	48,639
EMPLOYMENT	7,857	8,856
POLICE MANPOWER	52.4	54.1
HOSPITAL BEDS	60.5	62.3
PRIMARY SCHOOL CHILDREN	5,911	6,117
SECONDARY SCHOOL CHILDREN	5,036	5,211
GENERAL FUND REVENUES	\$ 39,068	\$ 40,220
SERVICE AREA FUNDS (x1000)	\$ 5,186	\$ 5,229
SCHOOL DISTRICT FUNDS	\$ 57,972	\$ 62,523

REVISED PROJECTIONS 1983 F.O.A.

SOCIOECONOMIC IMPACT MODEL

DEMOGRAPHIC ECONOMIC IMPACTS

1990

TALKEETNA

	WITHOUT-PROJECT	WITH-PROJECT
POPULATION	457	652
EMPLOYMENT	*	*
PRIMARY SCHOOL CHILDREN	57	86
ADDITIONAL SCHOOL ROOMS (AT 1/25)		1.16
SECONDARY SCHOOL CHILDREN	49	74
ADDITIONAL SCHOOL ROOMS (AT 1/21)		1.18

*** NOT DETERMINED, NO DIRECT
EMPLOYMENT IN TALKEETNA**

CONCLUSION – SOCIOECONOMICS

- **MINIMAL IMPACT AT THE BOROUGH LEVEL**
- **SIGNIFICANT IMPACTS TO SMALL ADJACENT COMMUNITIES**
- **CONFLICTS BETWEEN RESOURCES USER GROUPS**

RECREATION

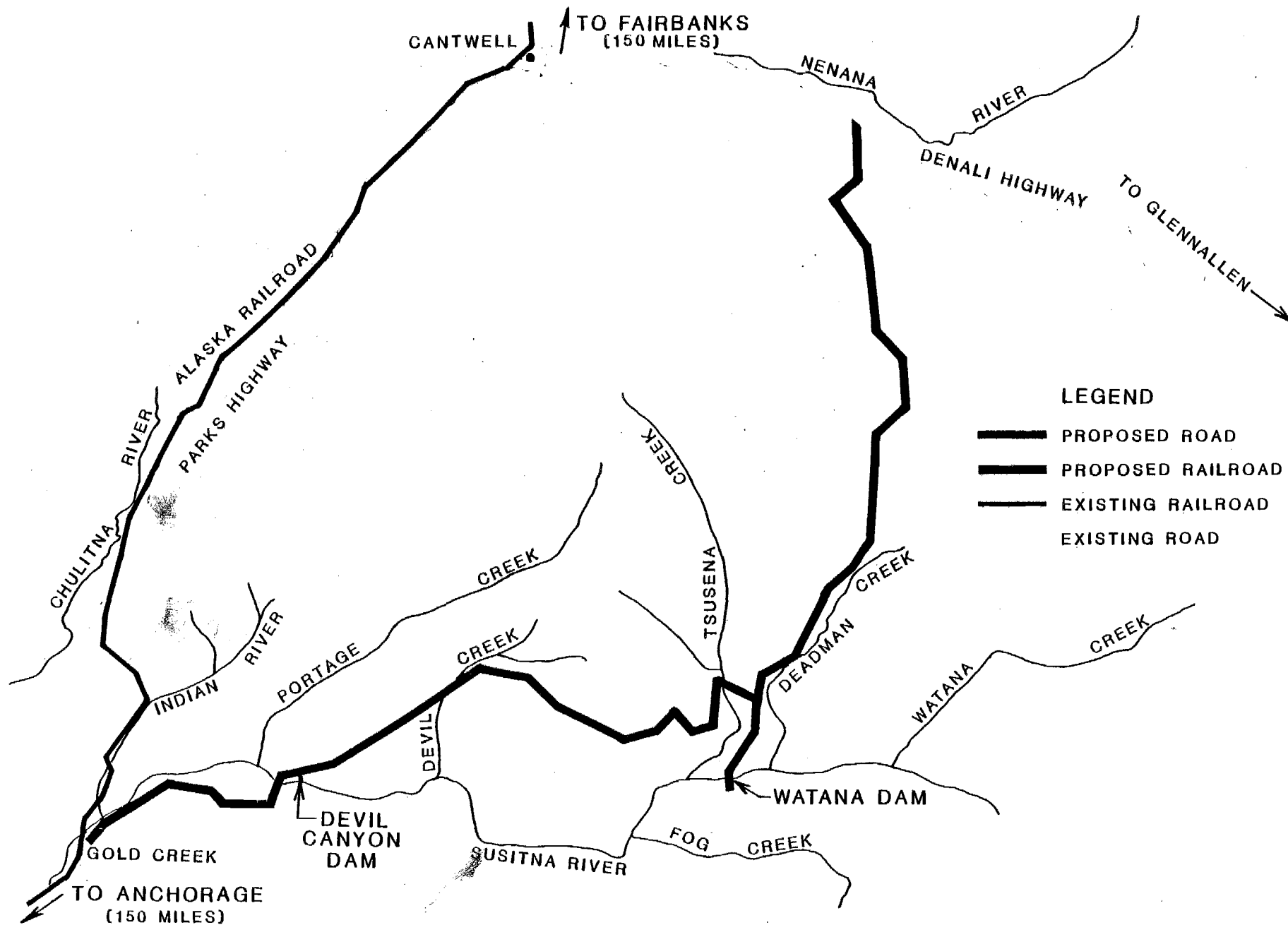
- **FISH AND WILDLIFE RESOURCE USERS**
- **HIKERS AND CAMPERS**
- **PUBLIC ACCESS ROUTE AND MANAGEMENT**
- **REFINEMENT OF RECREATION PLAN**

CONCLUSION-RECREATION

- **POST PROJECT: PUBLIC ACCESS WILL IMPACT FISH AND WILDLIFE WHILE PROVIDING RECREATIONAL OPPORTUNITIES**

LAND USE

- **ACCESS PLAN**
- **PUBLIC ACCESS**
- **LOCATION OF MITIGATION LANDS**
- **DEVELOPMENT PLANS OF ADJACENT LANDOWNERS**

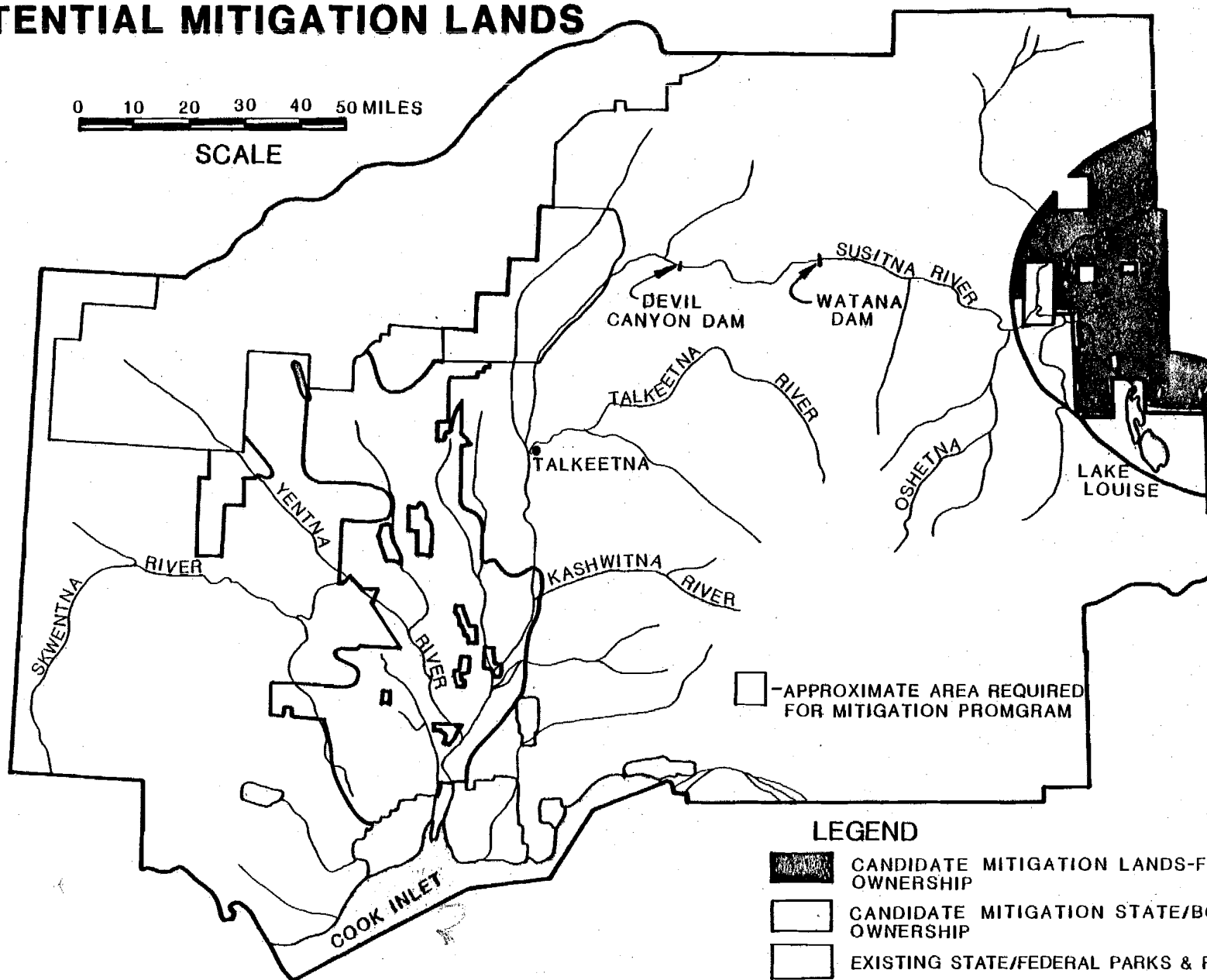


POTENTIAL MITIGATION LANDS

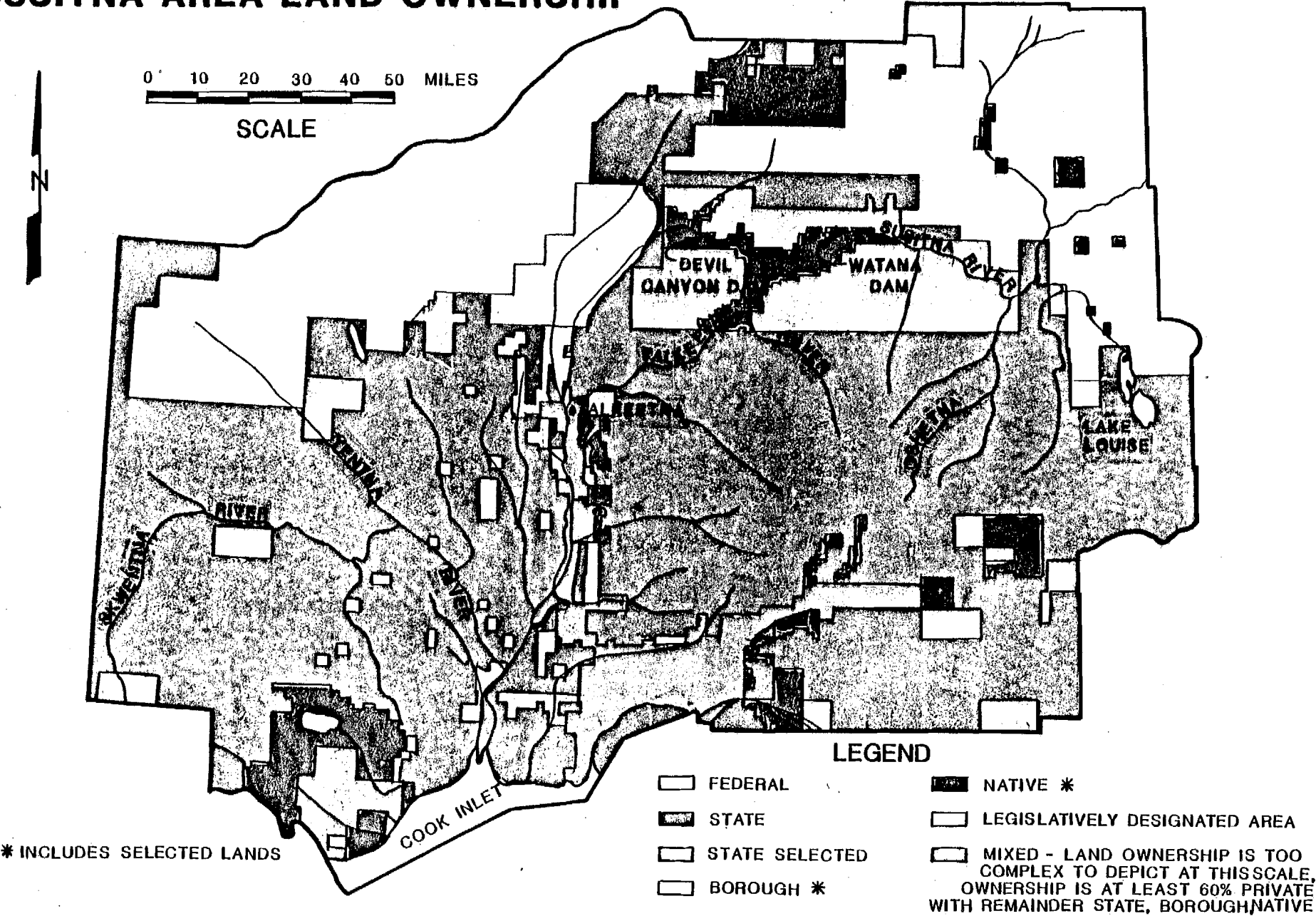


0 10 20 30 40 50 MILES

SCALE



SUSITNA AREA LAND OWNERSHIP



CONCLUSION - LAND USE

- **DEVELOPMENT OF ACCESS ROUTE BY PROJECT LEADS TO DEVELOPMENT OPPORTUNITIES ON ADJACENT LANDS**

REMAINING ISSUES

- **FISHERIES AND HYDROLOGY**

DEVELOPMENT OF MANAGEMENT PLANS

LOWER RIVER STUDIES

ICE DYNAMICS

- **WILDLIFE AND VEGETATION**

SELECTION OF MITIGATION LANDS

DEVELOPMENT OF MANAGEMENT PLANS

REMAINING ISSUES

- **SOCIOECONOMICS**

WORKER TRANSPORTATION

SHIFT / ROTATION AND ACCOMODATIONS

FISH AND WILDLIFE USERS ANALYSIS

- **LAND USE**

DETERMINE PUBLIC ACCESS POLICY

FINANCING OPTIONS

- **SOURCES OF FUNDS**
- **FINANCING OPTIONS SELECTED**
- **ANALYSIS OF OPTIONS**
- **CONCLUSIONS**

POTENTIAL SOURCES OF FUNDING

- **STATE CONTRIBUTION**

- **TAX EXEMPT DEBT**

- **RURAL ELECTRIFICATION
ADMINISTRATION GUARANTEED LOAN**

- **TAXABLE DEBT**

POTENTIAL SOURCES OF FUNDING

STATE CONTRIBUTION

- EQUITY

- RATE STABILIZATION FUND

- PERMANENT FUND

POTENTIAL SOURCES OF FUNDING

TAX EXEMPT DEBT

o REVENUE BONDS

LEVEL DEBT SERVICE

VARIABLE RATE BONDS

CREEPING COUPON BONDS

PUT BONDS

INSURED BONDS

o TAX EXEMPT COMMERCIAL PAPER

o GENERAL OBLIGATION BONDS

o LEVERAGED LEASE

POTENTIAL SOURCES OF FUNDING

- RURAL ELECTRIFICATION ADMINISTRATION GUARANTEED LOAN

POTENTIAL SOURCES OF FUNDING

TAXABLE DEBT

- TAXABLE BONDS

- PRIVATE PLACEMENTS

- TAXABLE COMMERCIAL PAPER

FINANCING OPTIONS SELECTED FOR ANALYSIS

**OPTION A : TAX EXEMPT REVENUE BONDS COMBINED WITH
STATE EQUITY AND RATE STABILIZATION FUND**

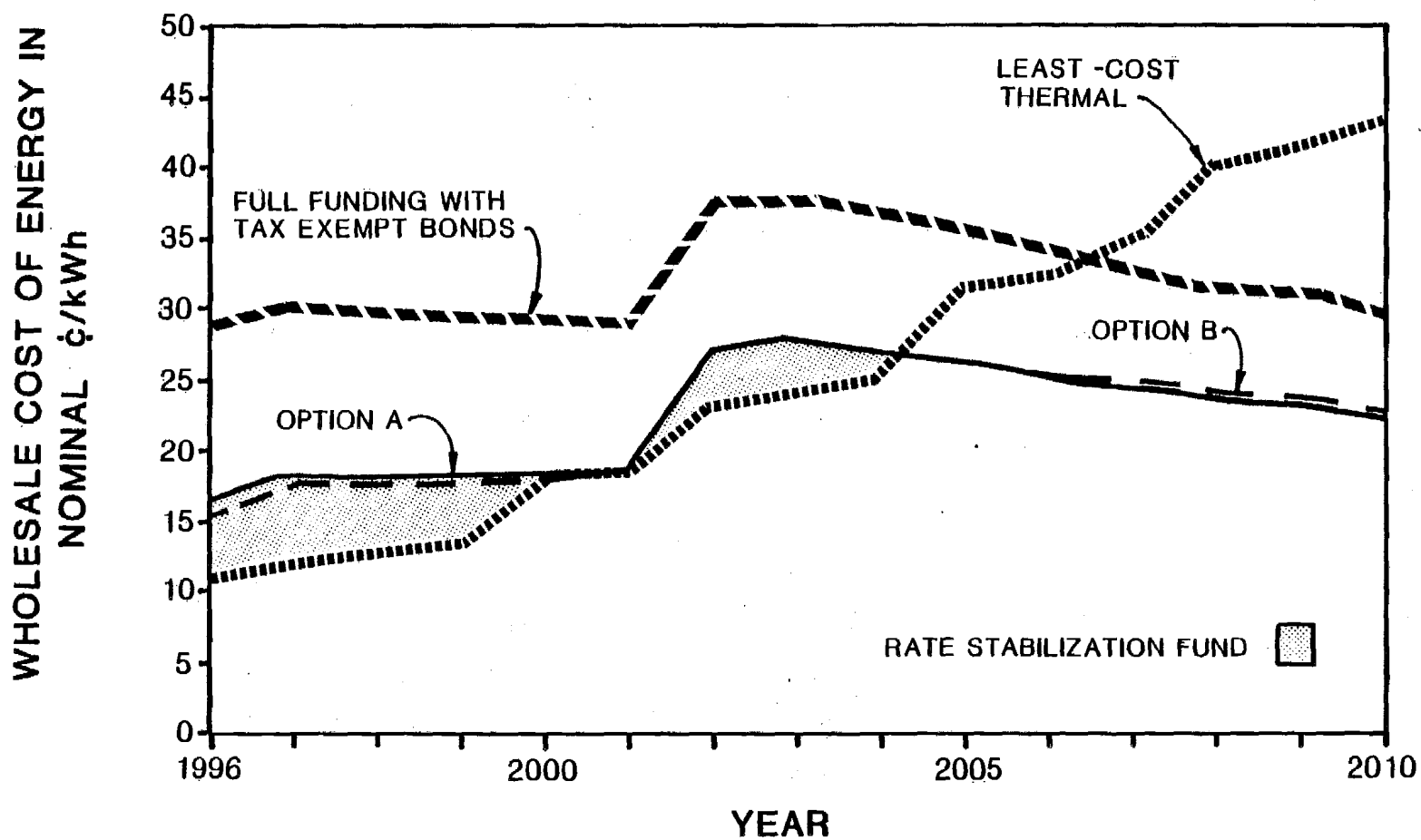
**OPTION B : REA GUARANTEED LOAN AND TAX EXEMPT
REVENUE BONDS (50/50) COMBINED WITH
STATE EQUITY AND RATE STABILIZATION FUND**

FUNDING REQUIREMENTS

(MILLION NOMINAL DOLLARS)

	<u>WATANA</u>	<u>DEVIL CANYON</u>	<u>TOTAL</u>
OPTION A			
TAX - EXEMPT BONDS	6,075	7,049	13,124
EQUITY	2,400	--	2,400
RSF	<u>1,013</u>	<u>463</u>	<u>1,476</u>
TOTAL	9,488	7,512	17,000
OPTION B			
TAX - EXEMPT BONDS	2,736	7,049	9,785
REA LOANS	2,332	--	2,332
EQUITY	2,700	--	2,700
RSF	<u>888</u>	<u>463</u>	<u>1,351</u>
TOTAL	8,656	7,512	16,168

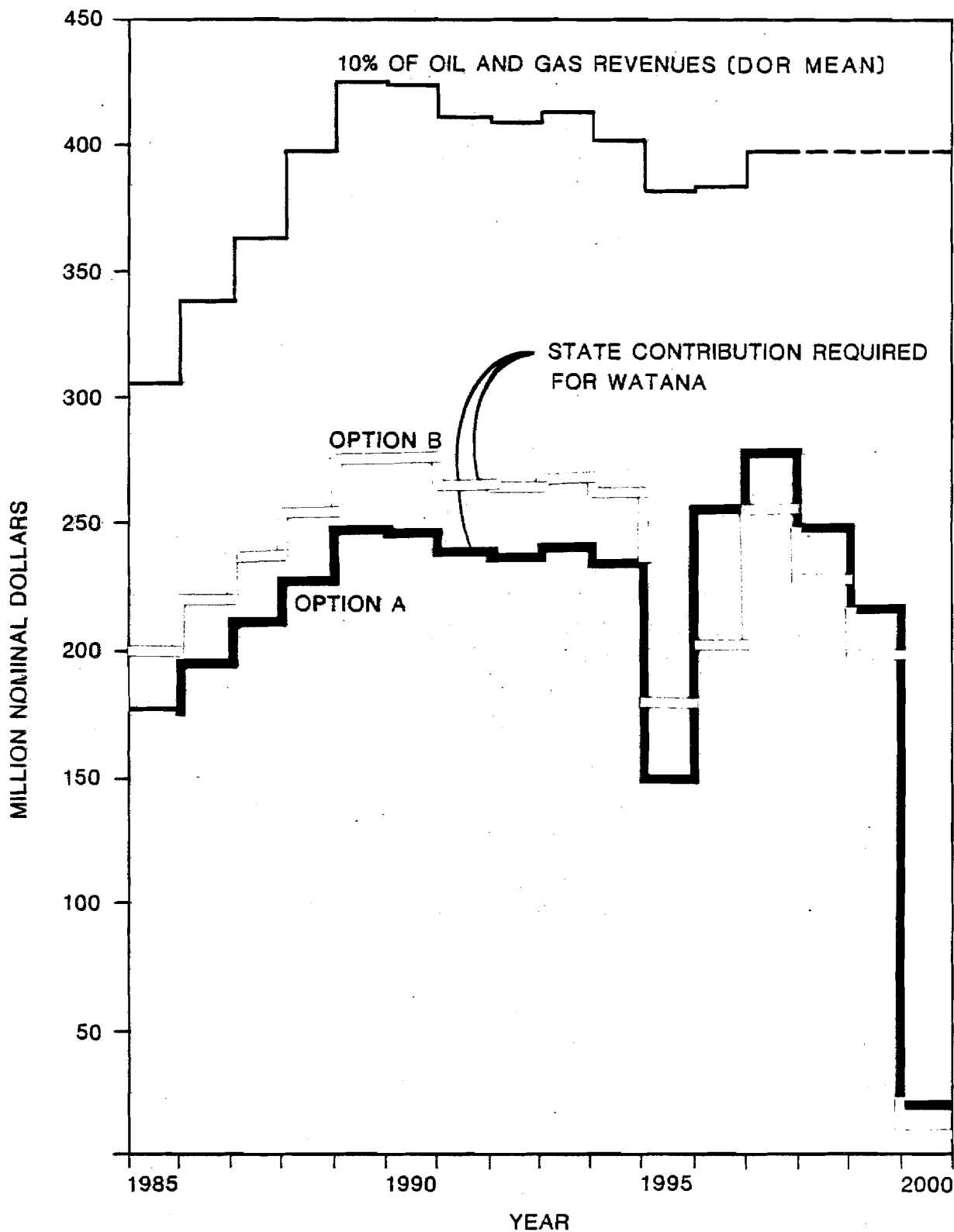
ENERGY COST COMPARISON



COMPARISON OF STATE EQUITY AND RSF CONTRIBUTIONS

(IN MILLION DOLLARS)

	<u>OPTION A</u>	<u>OPTION B</u>
NOMINAL DOLLARS		
EQUITY	\$ 2,400	\$ 2,700
RSF	<u>1,013</u>	<u>888</u>
TOTAL	\$ 3,413	\$ 3,588
IN 1983 DOLLARS		
EQUITY	\$ 1,519	\$ 1,707
RSF	<u>396</u>	<u>347</u>
TOTAL	\$ 1,915	\$ 2,054



**YEARLY STATE CONTRIBUTIONS
FOR FINANCING OPTIONS A AND B**

**ISSUES NEEDING RESOLUTION
BEFORE SUSITNA PROJECT PLAN OF FINANCE
CAN BE FINALIZED**

A. ECONOMIC AND FINANCIAL VIABILITY OF THE PROJECT

o ACCEPTABLE POWER RATES

o PUBLIC SUPPORT

o EXECUTIVE AND LEGISLATIVE COMMITMENT

**ISSUES NEEDING RESOLUTION
BEFORE SUSITNA PROJECT PLAN OF FINANCE
CAN BE FINALIZED**

- B. VALID POWER SALES CONTRACTS**
- C. TAX-EXEMPT STATUS OF SUSITNA REVENUE BONDS**
- D. ABILITY AND WILLINGNESS OF REA TO GUARANTEE DEBT
IN MEANINGFUL AMOUNTS**

**ISSUES NEEDING RESOLUTION
BEFORE SUSITNA PROJECT PLAN OF FINANCE
CAN BE FINALIZED**

- E. WILLINGNESS OF THE STATE TO ESTABLISH A DEDICATED
REVENUE SOURCE TO SUPPORT THE PROJECTS FINANCING
(PROPOSED MAJOR PROJECTS FUND)**

- F. WILLINESS OF THE STATE TO ALLOW THE USE OF ITS
"MORAL OBLIGATION" TO SUPPORT PROJECT FUNDING NEEDS
TO BE ASSESSED**

- G. WILLINESS OF RAILBELT UTILITIES (AND ULTIMATELY RAILBELT
CONSUMERS) TO PAY A PREMIUM PRICE FOR SUSITNA ENERGY
NEEDS TO BE EXPLORED AND VALIDATED**