

TCCOHO 8702

FEBRUARY 1987

THE PACIFIC SALMON COMMISSION
JOINT COHO TECHNICAL COMMITTEE REPORT

REPORT TCCOHO (87) 2

RESPONSE TO A REQUEST FROM THE NORTHERN PANEL
FOR INFORMATION ON STOCK COMPOSITION OF COHO HARVESTED IN
NORTHERN B.C. AND SOUTHEAST ALASKA

1. Introduction

This report was prepared by the Joint Coho Technical Committee (JCTC) in response to a request from the Northern Panel for information on the stock composition of coho harvested in fisheries in Southeast Alaska and Northern B.C.. This request was approved by the Pacific Salmon Commission (PSC) and relayed to the JCTC in a letter dated November 26th, 1986. Panel members are referred to the Report of the Joint Coho Technical Committee to the Pacific Salmon Commission (Report TCCHOHO (86) 1) for details on the coho stocks and fisheries in the Northern Panel area.

2. General Discussion

Stock composition estimates for coho catches in Northern B.C. and Southeast Alaska coho fisheries are currently available only from Reports of the Technical Committee on Salmon Interceptions (1971-1981) established as the result of U.S.-Canada Consultations on Salmon Problems of Mutual Concern. These estimates were derived primarily from past adult tagging data and are not considered to be statistically reliable due to the lack of complete tag recovery effort in all fisheries and spawning areas. Limitations associated with this method identified by the JCTC include i) recovery on spawning grounds and spawner estimation is required but extremely difficult, ii) fishery recoveries might not reflect country of origin, iii) recent stock levels and iv) inter-annual variability is not accounted for. There are other methods which can potentially be used to develop stock composition estimates for coho in a mixed stock fishery. Although biological markers and adult tagging have been used successfully for other species but to date they have had limited success for coho.

One of the most promising methods of estimating stock composition as indicated in the Joint Coho Technical Committee response to the Southern Panel (February 7, 1987) on a parallel question involves the analysis of coded wire tagging data of juveniles from indicator stocks which are assumed to be representative of stocks from a larger production area.

There are three main requirements necessary to generate a stock composition estimate using this method.

a) It must be possible to identify indicator stocks which can be adequately tagged and which accurately reflect migration and harvest patterns of untagged stocks which are to be represented.

b) CWT's must be applied to juveniles from a sufficient number of indicator streams to accurately estimate the distribution of production from each stock aggregate or production area.

c) The information must be available to accurately estimate the total production from each production area (ie. accurate total escapements or some equivalent) on an annual basis.

Furthermore because stock composition in a fishery may change significantly from year to year, the CWT recovery data should cover a long enough time period to identify these fluctuations.

3. Status of Available Data

It is not possible to estimate stock composition in Northern B.C. and Southeast Alaska fisheries at this time using the recommended or other methodologies. Rather, what is presented is a compilation of available coded wire tag recovery data for hatchery and wild stocks which is one component of the required data. It should be noted that these data describe the catch distribution of the tagged stock and not fishery catch composition and are highly dependant upon the location and intensity of fisheries.

3.1. Northern B.C.

The CWT recovery data available through the 1985 recovery year for Northern B.C. stocks is extremely limited. This information is available for hatchery stocks from five streams for a maximum of three brood years only and has the following limitations:

a) All CWT's have been applied to hatchery stocks. It is not clear that they accurately represent wild coho stocks - behaviour and survival of wild stocks may differ.

b) CWT recovery information is available for only five streams. These five streams are not representative of all Northern B.C. production areas.

c) In some cases the numbers tagged were insufficient to yield reliable results.

d) The recoveries do not cover a sufficient time period to detect inter-annual variation in distribution.

In addition to the limitations in the CWT recovery data, accurate coho escapement and productivity data necessary to estimate the total production from a given stock group (or production area) is currently not available.

Despite the limitations, CWT recovery data for the following Northern B.C. stocks is available (see Fig. 1 for locations):

Snootli Creek - Bella Coola River - Area B
Pallant Creek - Queen Charlotte Islands - Area 2E
Sachs Creek - Queen Charlotte Islands - Area 2E
Kispiox River - Skeena River - Area 4
Yakoun River - Queen Charlotte Islands - Area 1

The catch distribution of these hatchery stocks by fishery expressed as a percentage of the total catch of that stock is presented in Table 1. Exploitation rate data, or the percent of the total stock caught in fisheries is available only for the Pallant Creek hatchery stock. For the three years of available data (1983 to 1985) the exploitation rate has been 36.7, 38.3 and 48.2 percent respectively.

The amount of CWT data available for north coastal B.C. stocks is not sufficient to address the stock composition issue at this time. In addition to the paucity of data for north coastal stocks, there is no data available for transboundary river stocks. North coastal B.C. stocks which have been tagged in 1986 are all associated with hatcheries and include; Pallant

Creek on the Queen Charlotte Islands, Babine River, Kispiox River and Toboggan Creek in the Skeena drainage, Kincolith River in Area 3, Kloiya Creek in Area 4, Kitimat River and Hartley Bay Creek in Area 6 and McGloughlin Bay Creek in Area 7. Tagging in these locations will continue for a minimum of three years. Coded wire tagging of Stikine and Taku River stocks was conducted by Canada for the first time in 1986 and is expected to continue. In addition to these locations, a network of indicator stocks will be established, if resources permit, which will provide representative wild stock production (escapements and smolt production) data and exploitation rates. The first of these sites is being established in 1987 on the Lachmach River at the head of Work Channel in Area 3. These monitoring sites will serve a dual purpose in that they will also be used to study coho productivity patterns in northern streams.

Estimates of wild stock production will also be required if stock composition estimates are to be made. Spawning escapement estimates for northern B.C. coho stocks might be indicators of production in some areas but are not reliable measures of absolute escapement. An extensive habitat inventory and juvenile assessment program might be a more viable alternative to improving escapement estimates to the accuracy required for stock composition purposes. Canada will be exploring the feasibility of this approach as part of its research and monitoring program into northern coho productivity.

3.2. Southeast Alaska

Coded wire tagging of select coho salmon stocks in Southeast Alaska was initiated in 1976. Since then, information on stock contributions by area, gear type, and time period has been collected for a number of hatchery and wild stocks distributed throughout the region. Most wild stock tagging has been conducted to obtain information for use in fishery management. Hatchery stocks have been tagged for evaluation of hatchery practices and enhancement projects, and for management of mixed stock fisheries which harvest intermingling natural and hatchery stocks.

For purposes of this presentation, Southeast Alaska stocks and fisheries were grouped into nine geographical areas that correspond to the Pacific Marine Fisheries Commission groupings of Alaska's regulatory districts (Fig. 2-1). Code wire tag data is available for selected stocks in all but one of these areas (Central Intermediate). Estimates of the 1982-83 average harvest distribution and escapement as a percentage of the total return were computed for tagged stocks in five major areas and for a single hatchery stock (Fig. 2-2 to 2-8). In addition, distribution of the harvest by area and gear type was estimated for seven other stocks and stock groups (Fig. 2-9 to 2-15). The two sets of figures should be interpreted separately since the first seven account for total runs (catch plus escapement) while the second seven account only for harvest. Much of the data reported is still preliminary.

More recent information is available on coded wire tagged coho from several hatcheries in southern Southeast Alaska. Two enhancement facilities, Whitman Lake and Neets Bay, operated by the Southern Southeast Alaska Regional Aquaculture Association, had significant returns of coded wire tagged coho during 1985 and 1986. Coho returning to these two facilities have migratory patterns similar to coho produced at Tangass, Klawock and Deer Mountain hatcheries, also in the southern portion of the region.

During 1985, catch patterns of coho from these facilities indicated a more

southerly entry pattern to inside waters than in 1986. An estimated 8 and 7 percent of the total mixed stock harvest of Neets Bay and Whitman Lake coho respectively was taken in Northern British Columbia fisheries (Table 2). In 1986, when a more northerly entry pattern was observed, it is estimated that approximately one percent of the harvest of each stock was taken in Northern British Columbia. The factors contributing to these different entry patterns is not currently known, nor is the frequency with which they occur.

For a discussion of the harvest distribution, migratory patterns, harvest rates and migratory timing of these stocks the reader is referred to the Report of the Joint Coho Technical Committee to the Pacific Salmon Commission (PSC Report TCCoho (86) 1)

4. Information and Research Needs

If mutually agreed upon coho stock composition estimates are to be derived for northern fisheries, it will be necessary to jointly develop a coordinated research program. Given the extensive areas involved, the large numbers and diverse nature of natural coho stocks in both countries, and the limited information currently available, it is anticipated that a major, long term research and monitoring program would be required.

The feasibility of producing coho stock composition estimates for Northern B.C. and Southeast Alaska fisheries using stock distribution information from a series of indicator stocks and information on hatchery and wild production should be evaluated. This would require expanded coded wire tagging programs on wild stocks in both countries but especially in Canada. In addition, research and monitoring to evaluate the magnitude of wild stock production in both countries would be required.

Feasibility of other stock identification methodologies should also be explored, especially if gross stock composition estimates involving only the resolution of country of origin are required. Some studies are currently being conducted in northern areas on several stock identification techniques by the U.S. under national Treaty support funding. Methods being explored include scale pattern analysis, GSI (genetic stock identification), parasite analysis, rare element analysis and combinatorial use of such characteristics. For fishery management purposes, a finer stock resolution will be required and experience to date would suggest that biological markers might have limited application.

TABLE 1.
Percent Distribution of North Coastal B.C. Hatchery Stocks by Primary Recovery Year

Fishery	Snootli Cr.		Pallant Cr.			Sachs Cr.	Kispiox R.	Yakoun R.
	1984	1985	1983	1984	1985	1984	1983	1983
Northern Troll (1-5)	30.34	48.45	81.06	52.61	23.77	53.31	31.77	93.89
North Central Troll (6-8)	11.22	7.95	0.87	0.00	0.00	0.00	0.00	0.00
South Central Troll (9-10)	9.67	1.57	0.00	1.49	0.00	1.57	0.00	0.00
NWVI Troll (25-27)	3.38	8.65	1.11	3.69	0.00	0.00	0.00	0.00
SWVI Troll (21-24)	0.00	0.00	0.00	2.06	1.01	0.00	0.00	0.00
Northern Net (1-5)	0.00	3.54	1.71	8.90	38.13	17.11	39.57	0.00
Central Net (6-10)	20.81	19.55	0.00	1.11	0.00	0.00	0.00	0.00
Johnstone St. Net (11-13)	2.60	4.26	0.00	0.00	0.00	0.00	0.00	0.00
Georgia St. Net (14-19)	0.00	0.00	0.00	1.01	0.00	0.00	0.00	0.00
Northern Sport (1-5)	0.00	0.00	3.29	21.41	24.37	23.45	6.24	0.87
Georgia St. Sport (13-19)	0.00	0.00	0.56	0.00	1.65	0.00	0.00	0.00
Freshwater Sport	0.00	0.00	0.00	1.13	8.57	0.00	0.00	0.00
Alaska	21.97	6.03	11.41	6.58	2.50	4.56	22.41	5.24
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: Figures for Snootli Creek and Pallant Creek differ from those in the Report of the Coho Technical Committee to the Pacific Salmon Commission (Report TCCOHO (86) 1). These changes are largely due to updated Alaska data.

TABLE 2. ESTIMATES OF HARVEST DISTRIBUTION OF CODED WIRE TAGGED COHO SALMON FROM WHITMAN LAKE AND NEETS BAY HATCHERIES IN SOUTHERN SOUTHEAST ALASKA IN 1985 AND 1986.

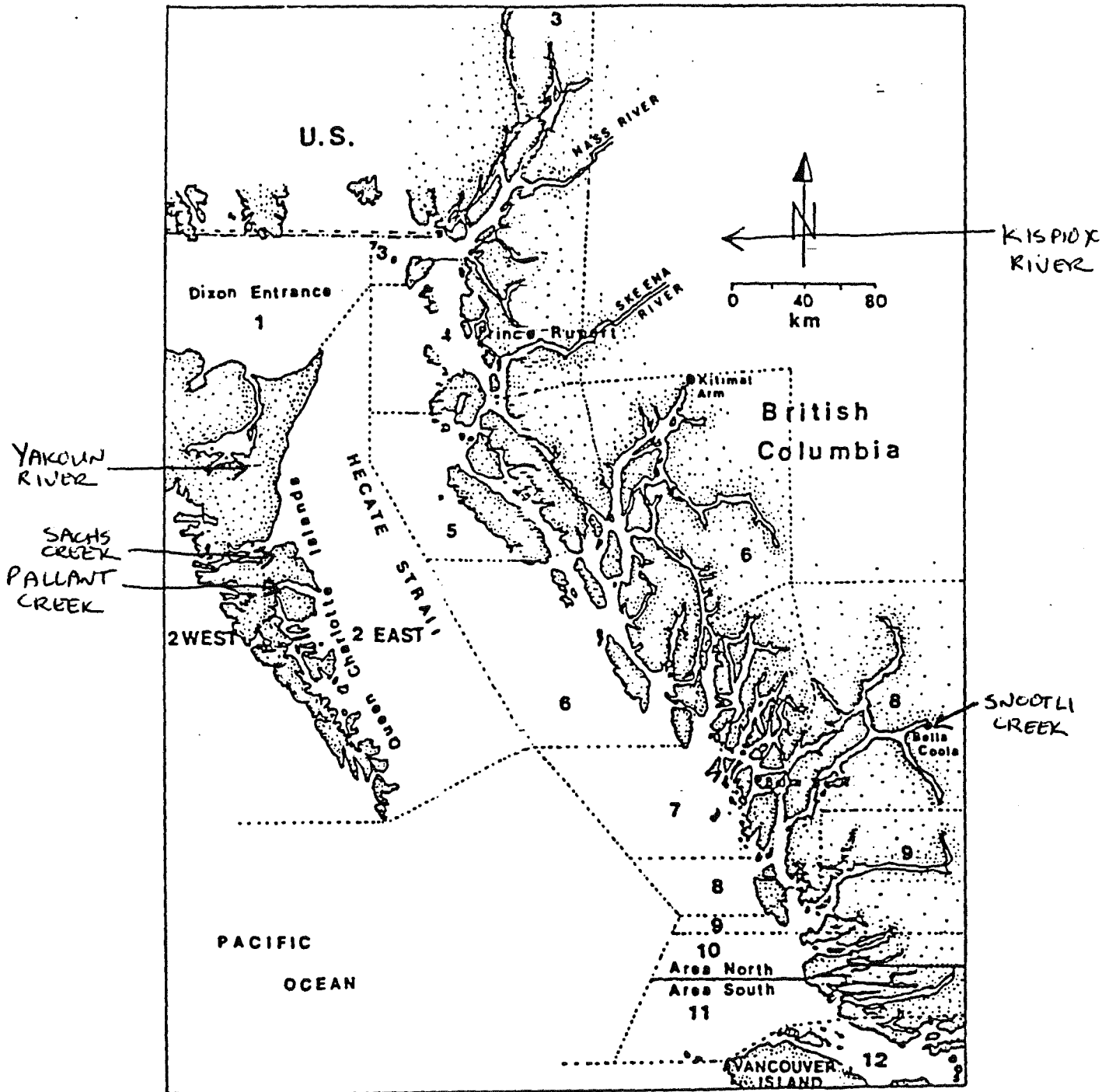
FISHERIES	NEETS BAY		WHITMAN LAKE	
	NUMBER	PERCENT	NUMBER	PERCENT

1985				
SOUTHEAST ALASKA COMMERCIAL AND SPORT	69,000	92%	31,500	93%
N. BRITISH COLUMBIA COMMERCIAL AND SPORT	6,000	8%	2,500	7%
TOTALS	75,000	100%	34,000	100%

1986				
SOUTHEAST ALASKA COMMERCIAL AND SPORT	161,000	99%	109,000	99%
N. BRITISH COLUMBIA COMMERCIAL AND SPORT	1,000	1%	1,500	1%
TOTALS	162,000	101%	110,500	100%

DATA SOURCE: SOUTHERN SOUTHEAST REGIONAL AQUACULTURE ASSOC.
(Gary Freitag; Pers. Comm.)

Figure 1. Statistical Areas of British Columbia.



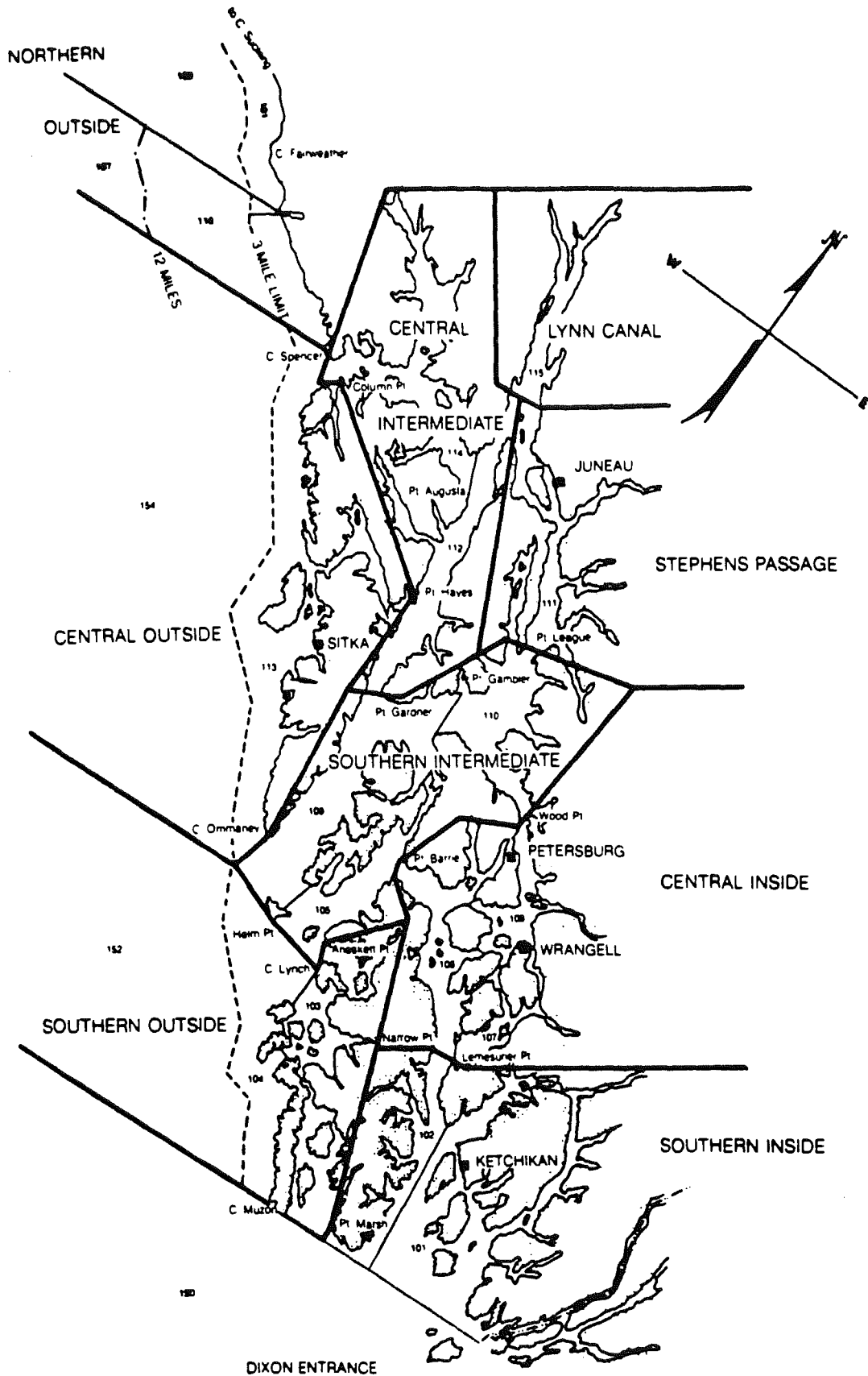


Figure 2-1. Geographical groupings of coho salmon stocks and fishing districts in Southeast Alaska.

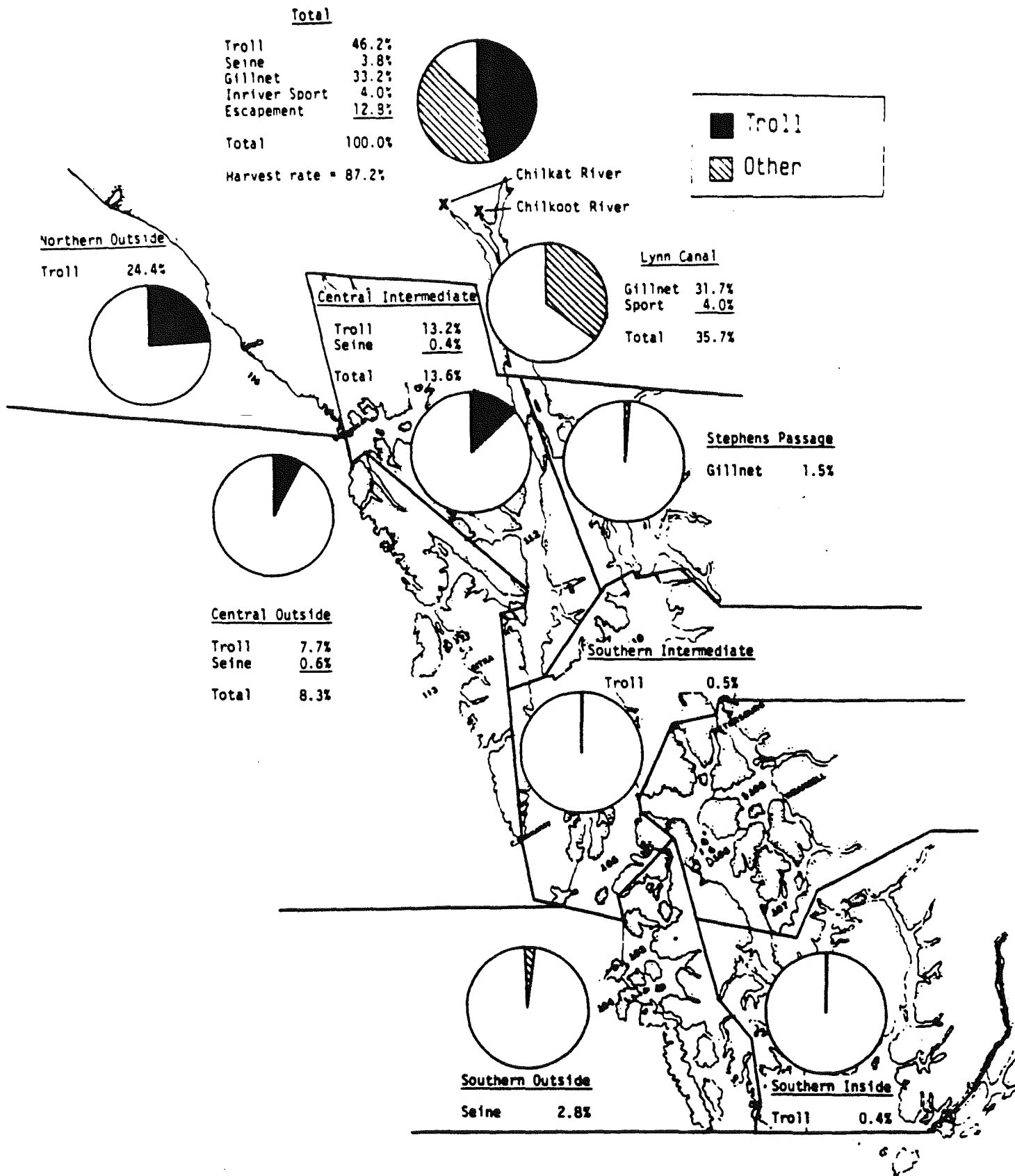


Figure 2-2. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Upper Lynn Canal systems (Chilkoot and Chilkat Rivers), 1983.

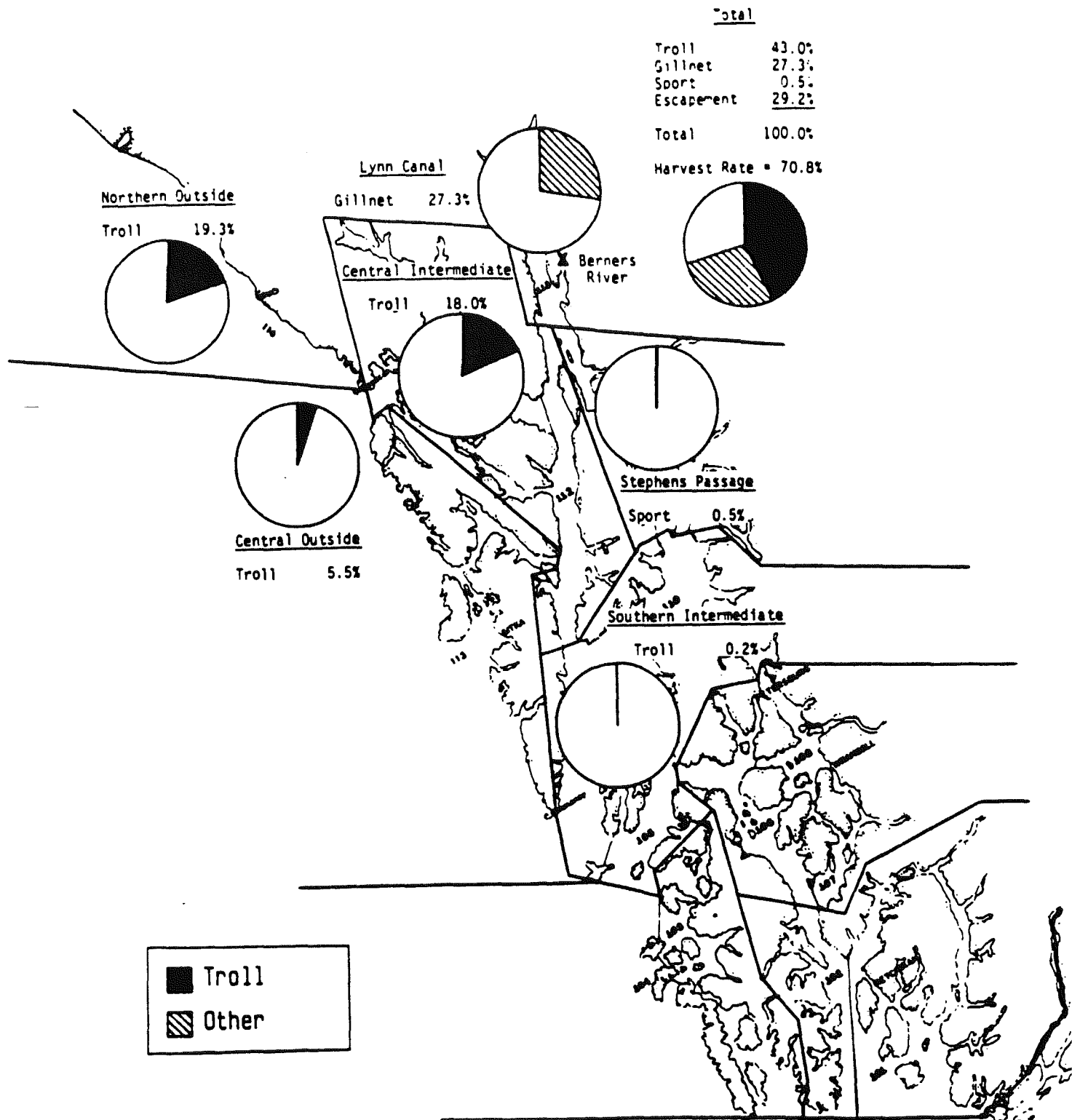


Figure 2-3. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to the Berners River in Lower Lynn Canal, 1982-1983.

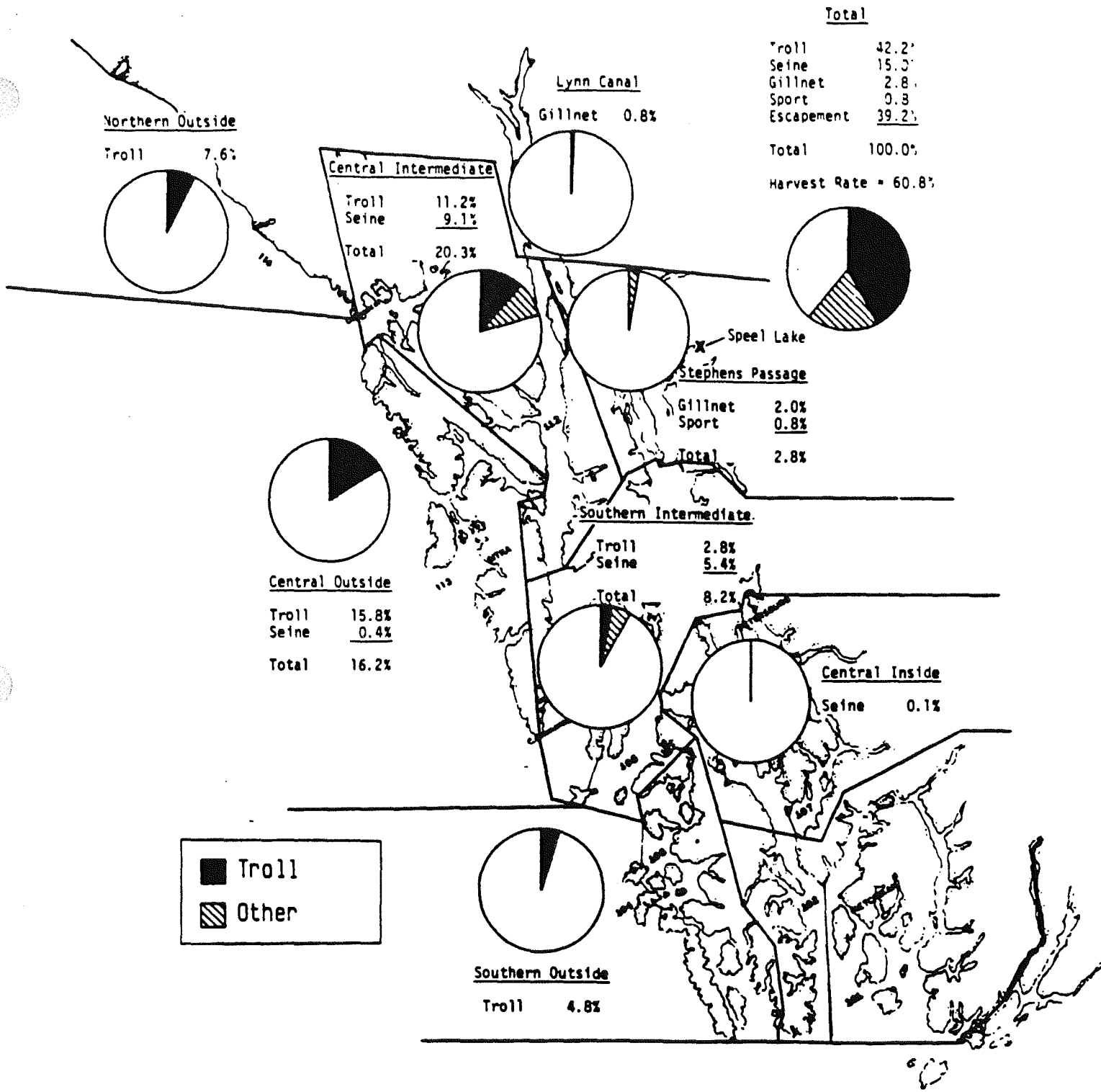


Figure 2-4. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Speel Lake near Stephens Passage, 1982-1983.

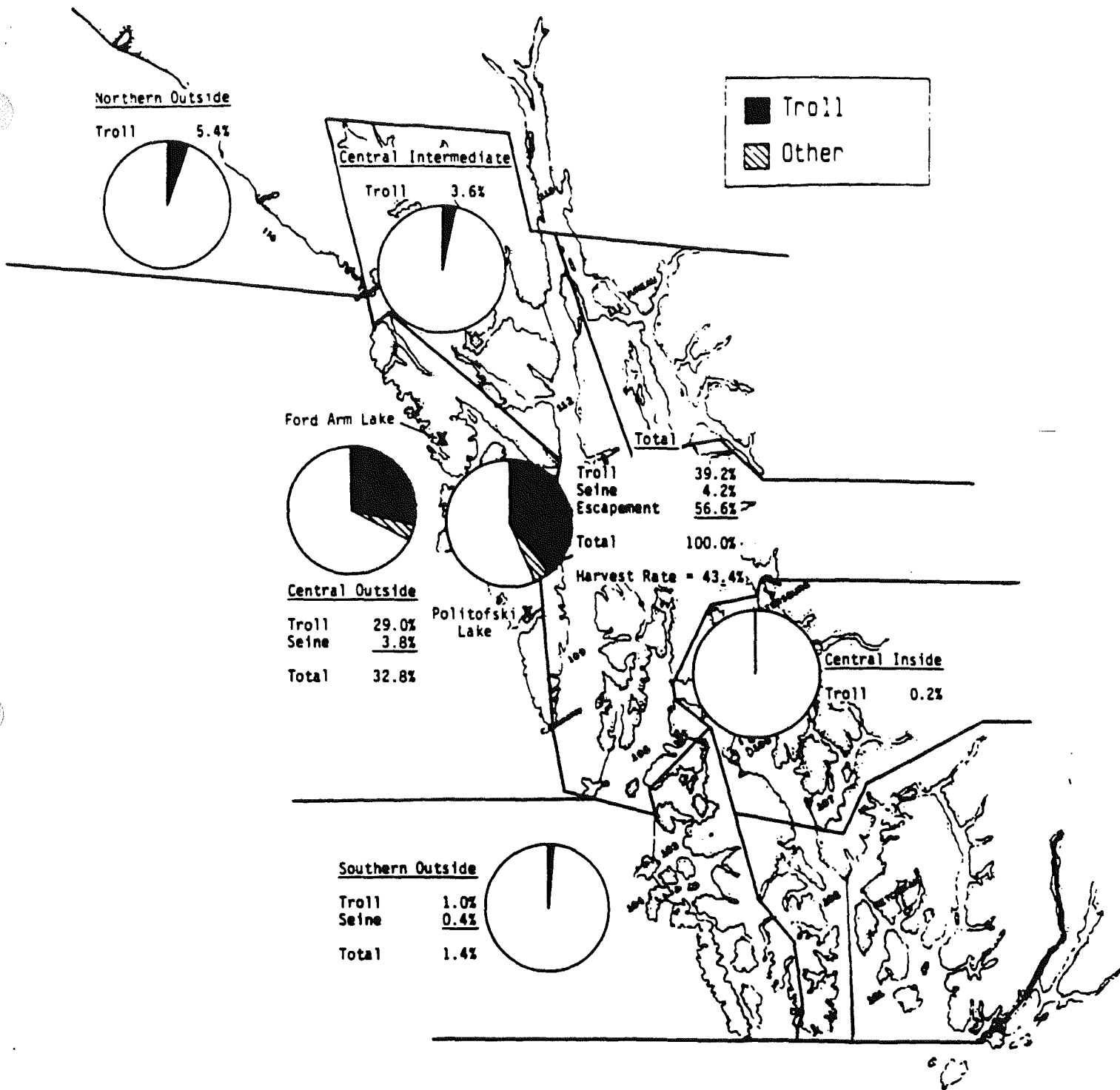


Figure 2-5. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Ford Arm and Politofski Lakes in the central outside area, 1982-1983.

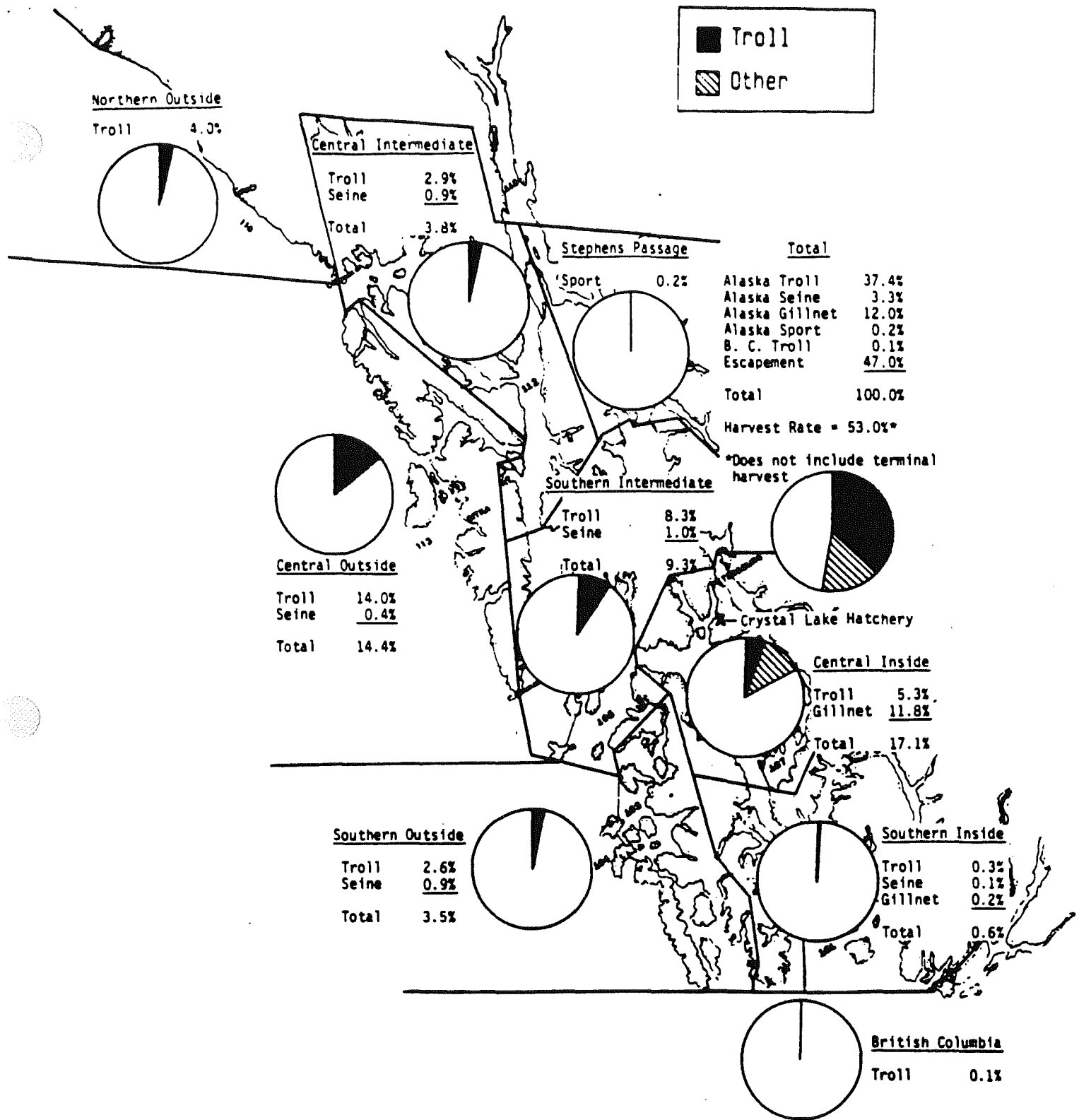


Figure 2-6. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Crystal Lake Hatchery in the central inside area, 1982-1983.

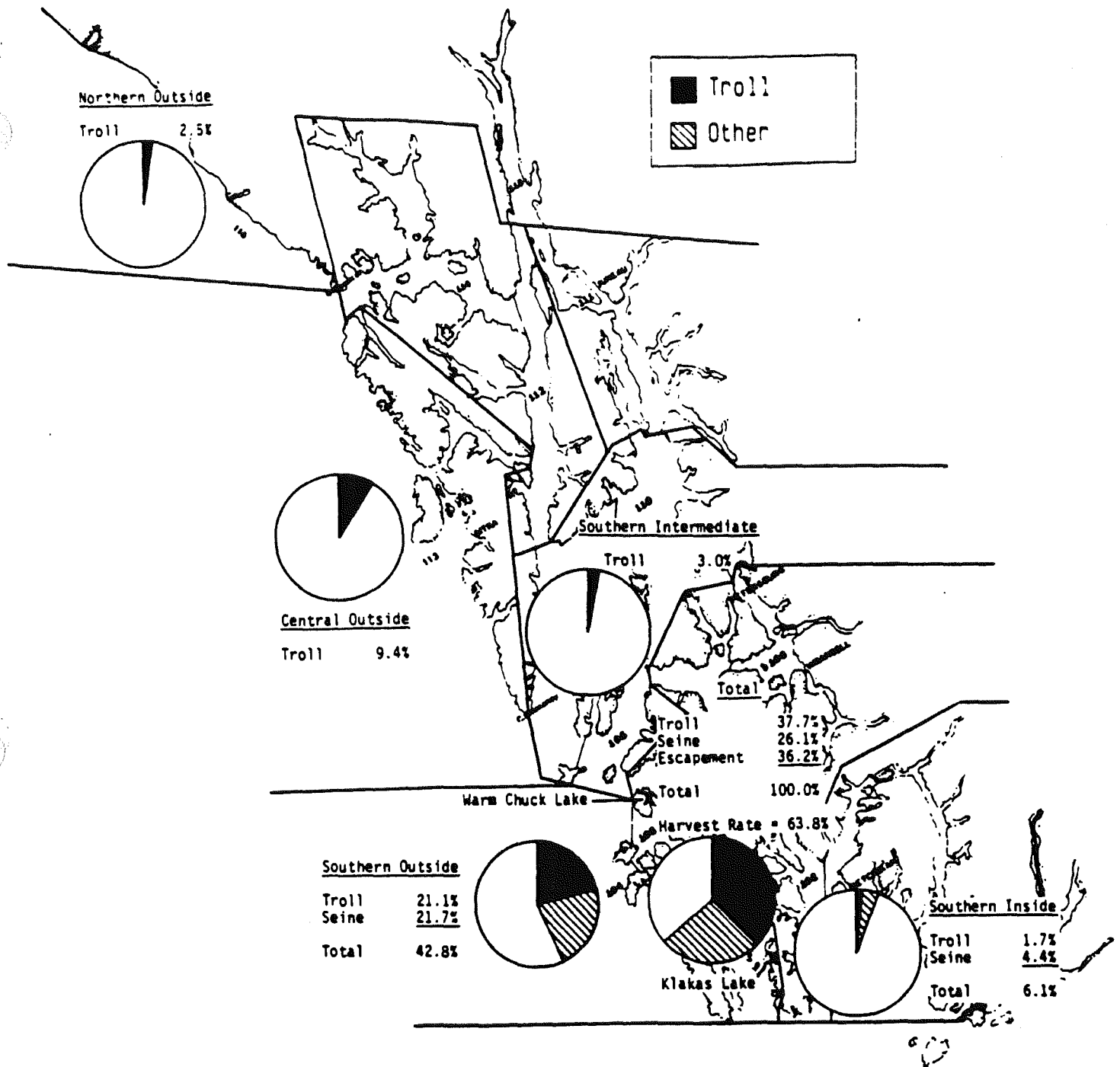


Figure 2-7. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Warm Chuck and Klakas Lakes in the southern outside area, 1982-1983.

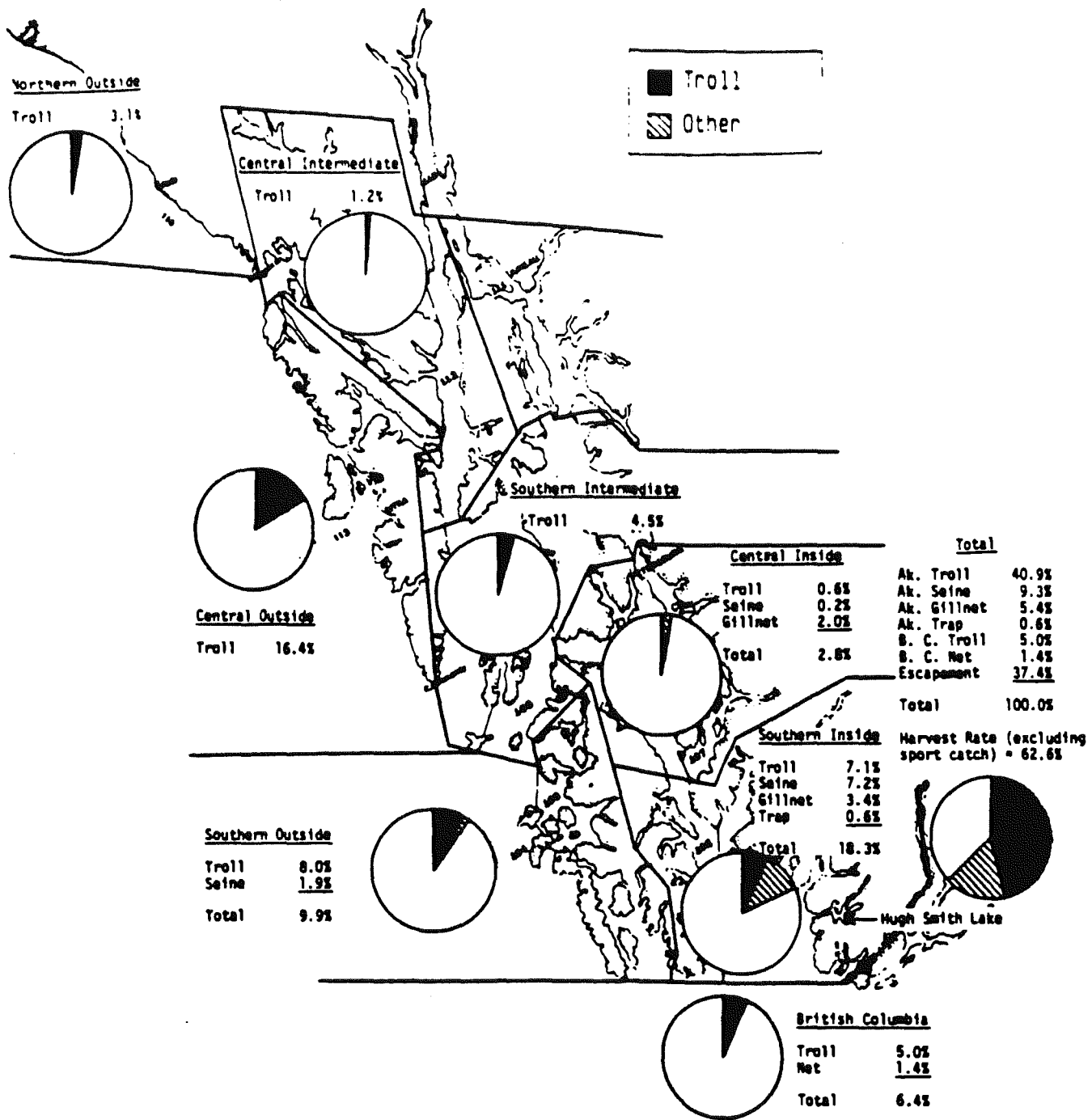


Figure 2-8. Estimated average harvest distribution and escapement as a percentage of the total return of coded-wire tagged coho salmon to Hugh Smith Lake in the southern inside area, 1982-1983.

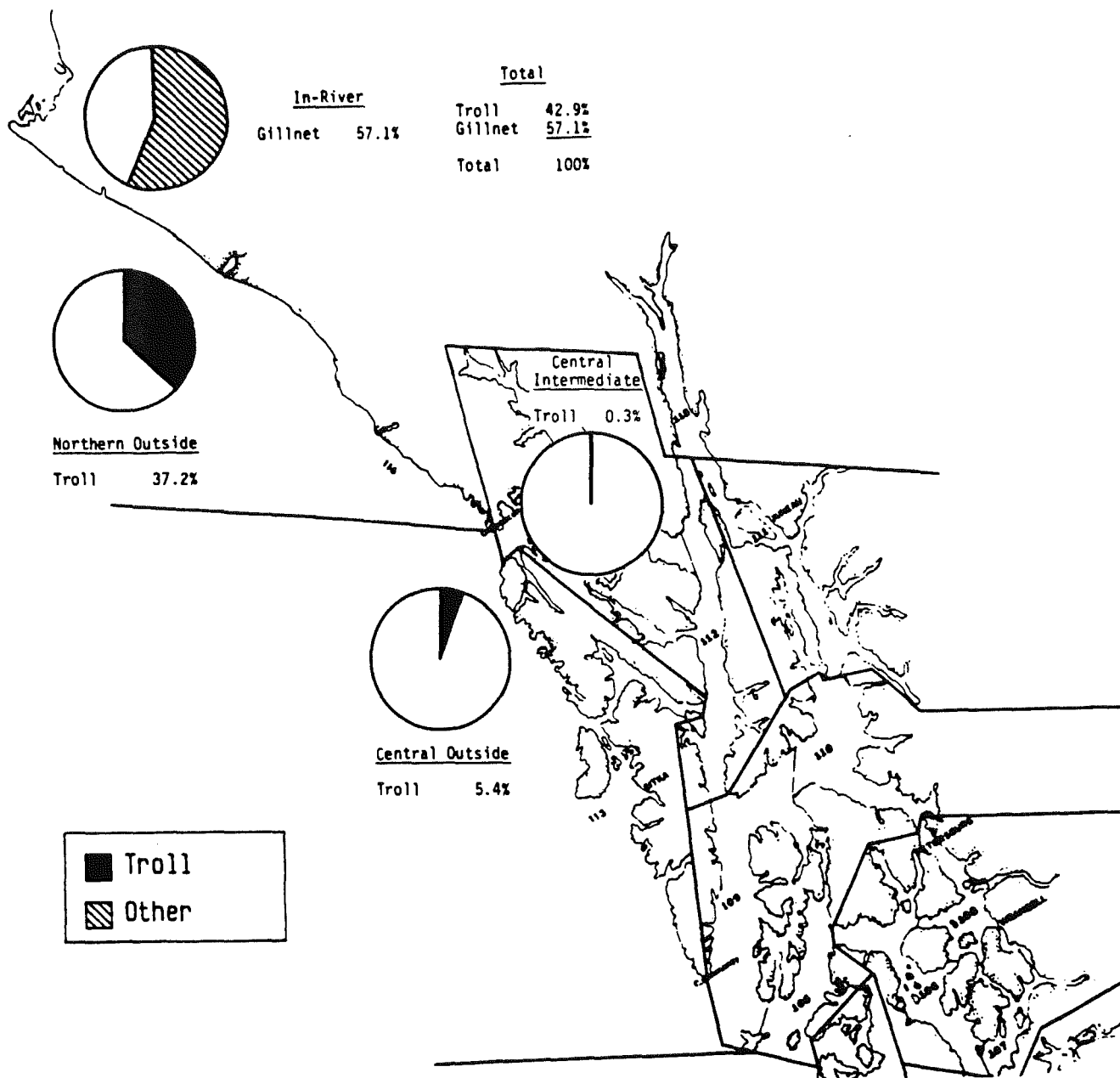


Figure 2-9. Estimated average harvest distribution as a percentage of the total commercial catch of coded-wire tagged coho salmon from four Yakutat area systems, 1985-1986. The figure reflects the average distribution for four tag return groups (Situk River 1985; Lost River 1986; Akwe River 1986; Tsiu River 1986).

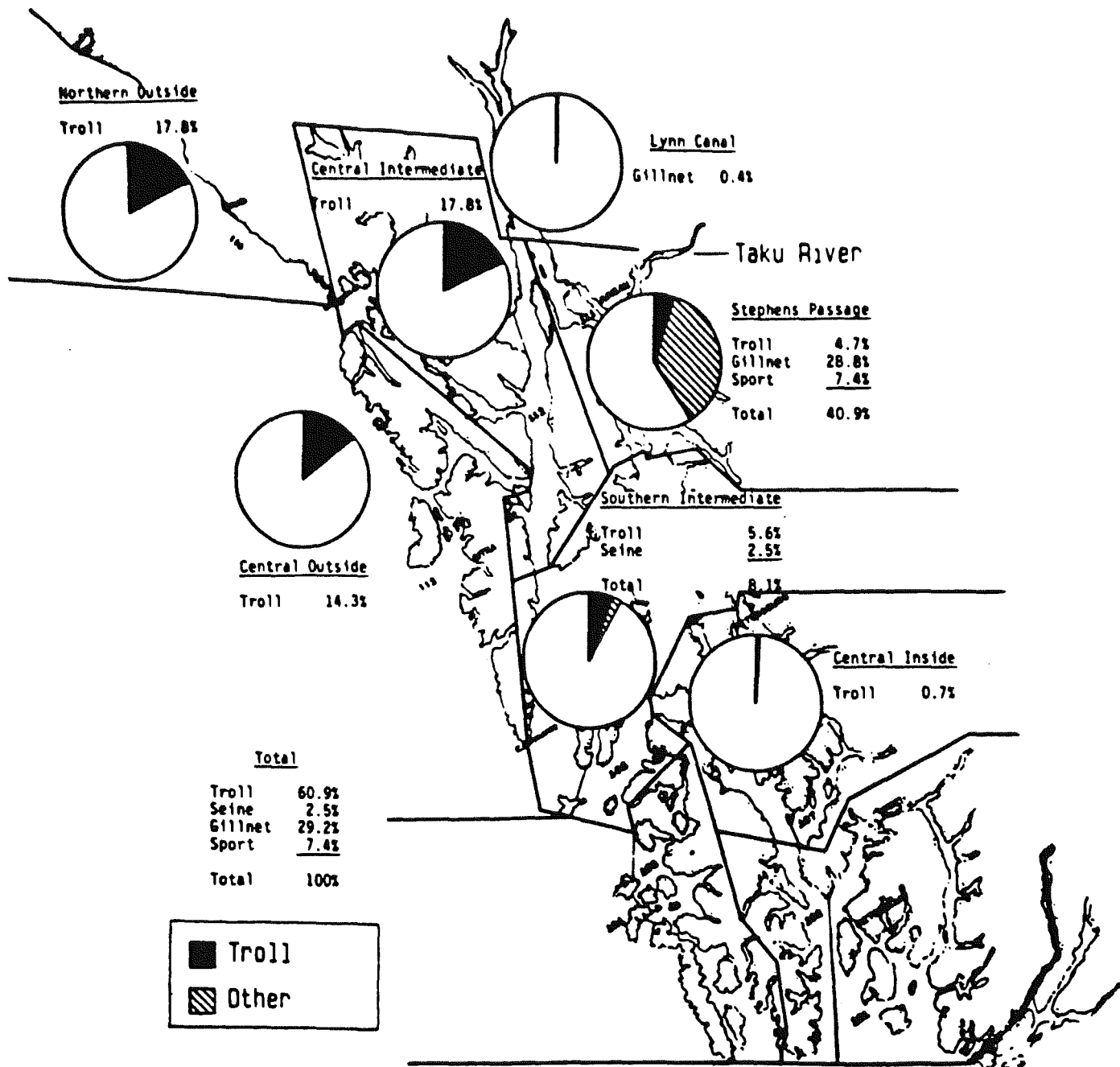


Figure 2-10. Estimated distribution of the total marine harvest of tagged coho salmon from the U.S. Section of the Taku River, 1977-79.

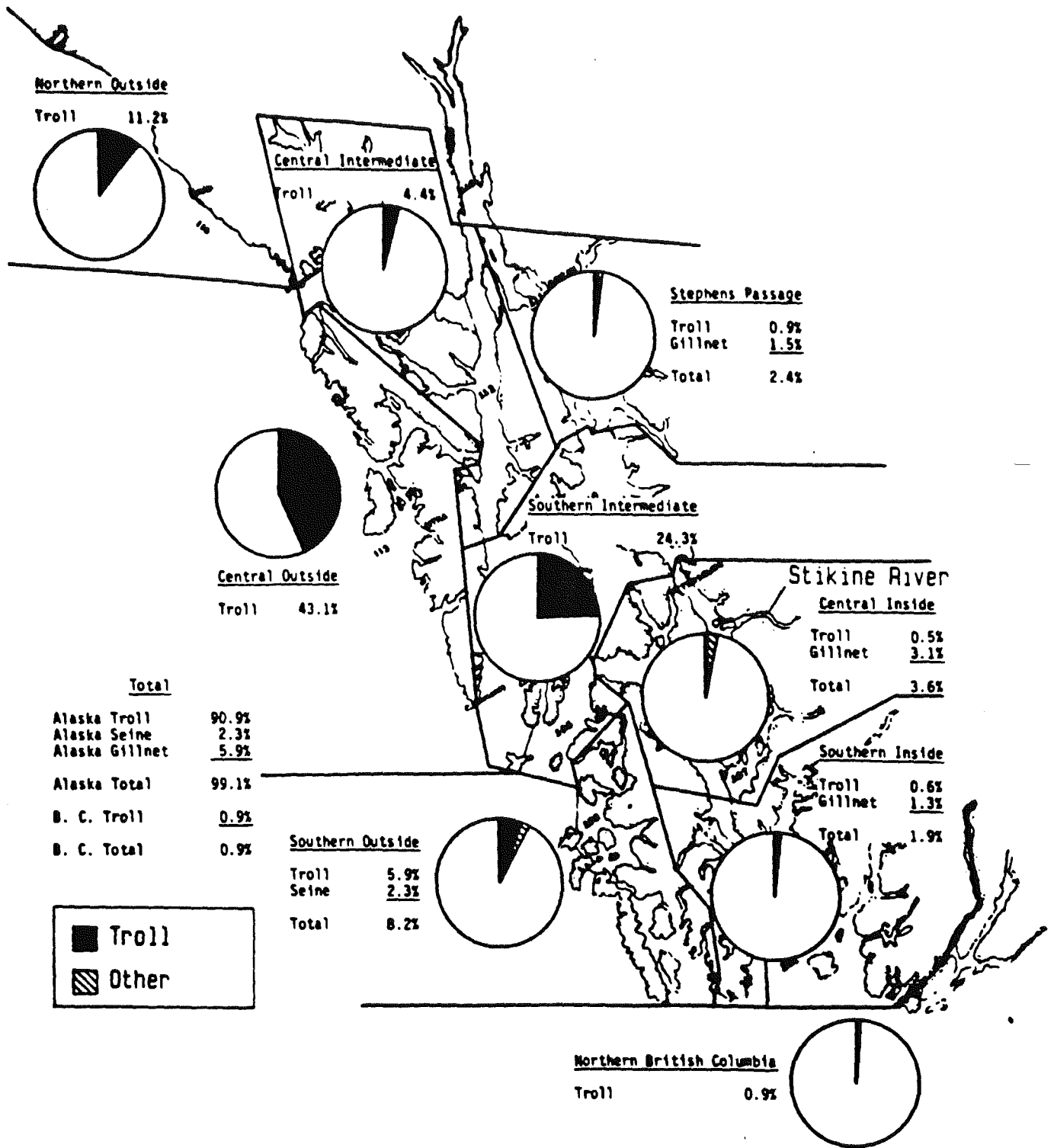


Figure 2-11. Estimated distribution of the total marine harvest of coded-wire tagged coho salmon from the U.S. Section of the Stikine River, 1979-82.

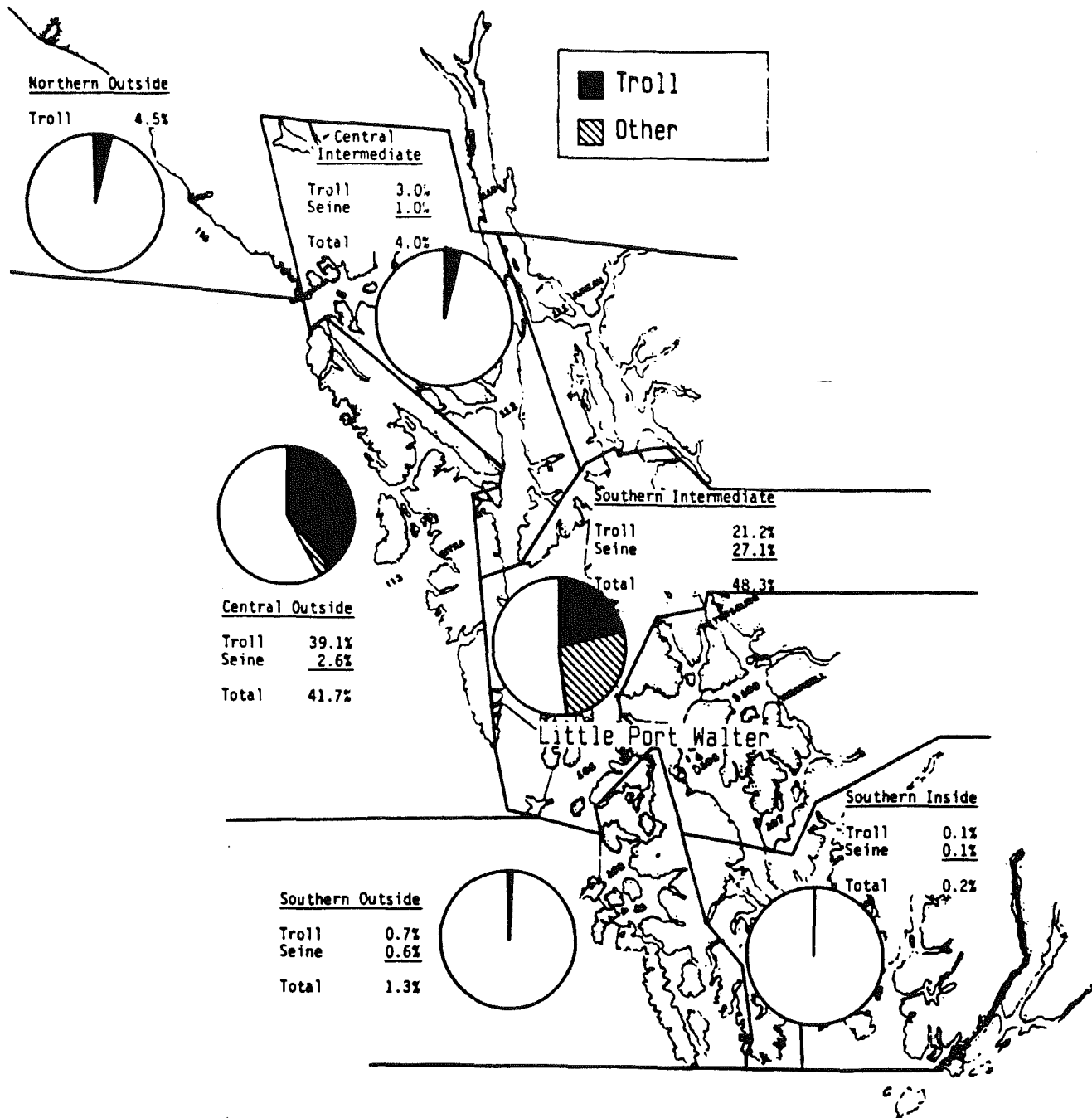


Figure 2-12. Estimated average harvest distribution as a percentage of the total commercial catch of coded-wire tagged coho salmon from the Little Port Walter Hatchery, 1982-1983.

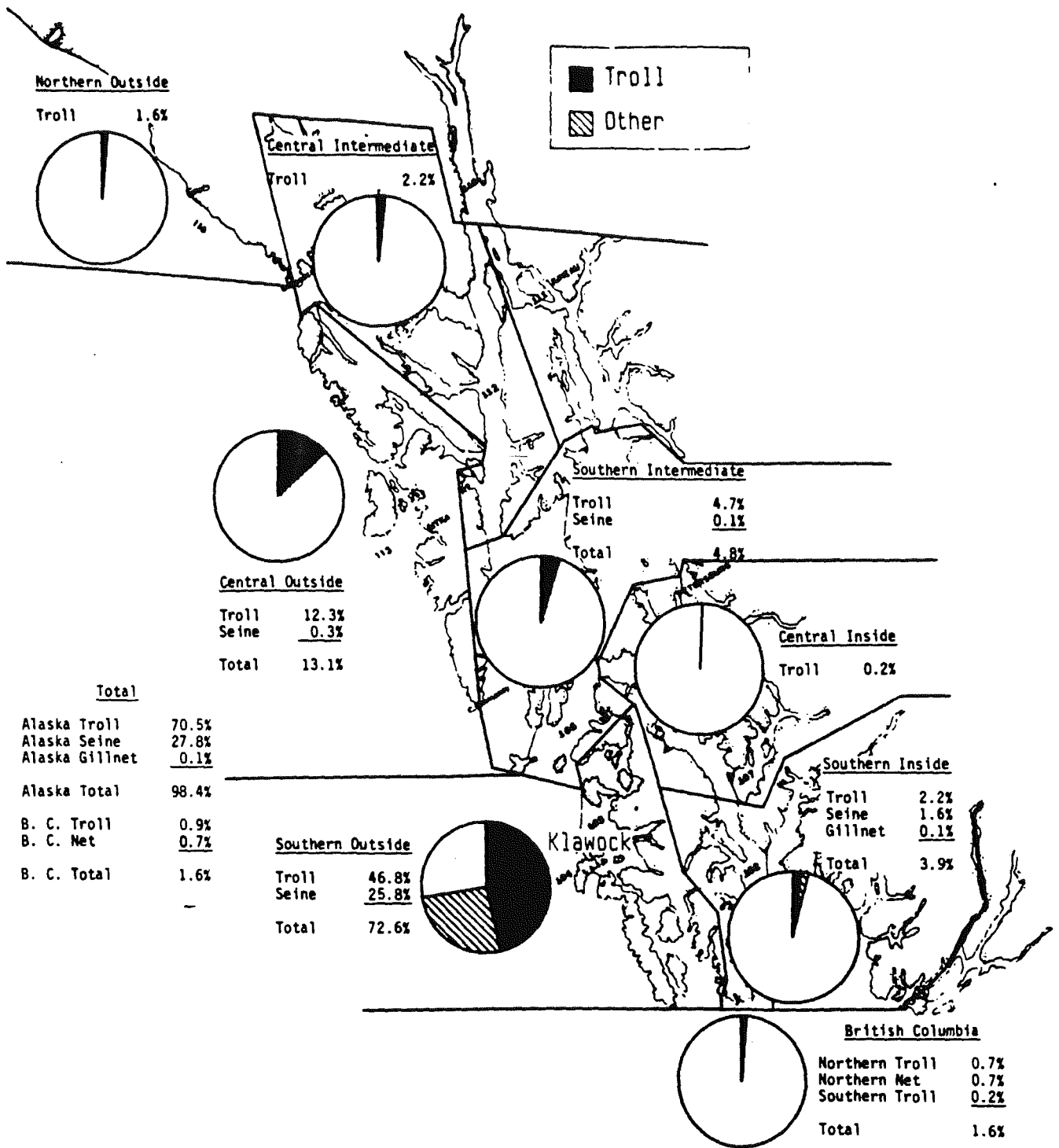


Figure 2-13. Estimated average harvest distribution as a percentage of the total commercial catch of coded-wire tagged coho salmon from the Klawock Hatchery, 1982-1983.

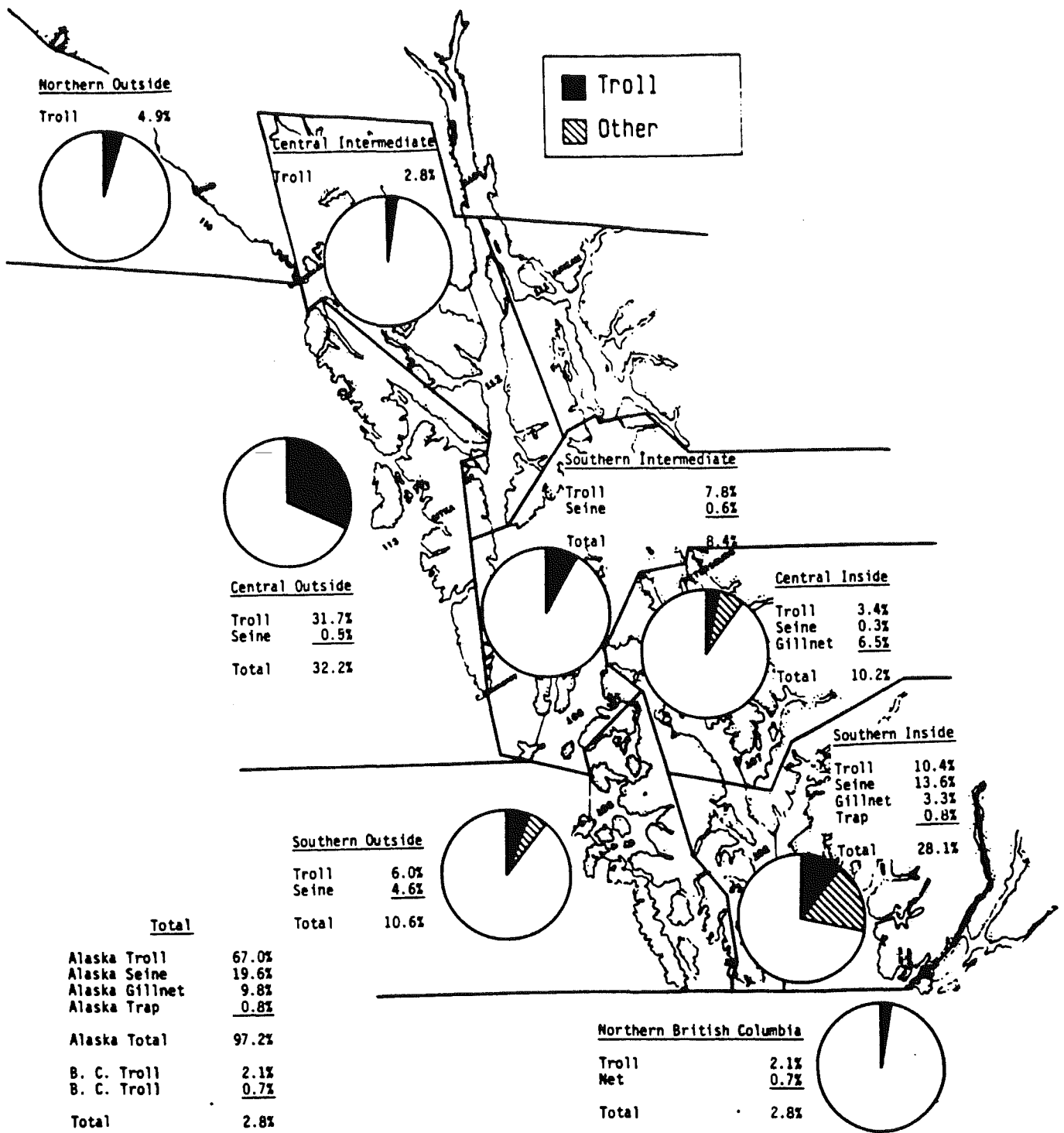


Figure 2-14. Estimated average harvest distribution as a percentage of the total commercial catch of coded-wire tagged coho salmon from hatcheries in the southern inside area (Districts 101 and 102), 1982-1983. Only recoveries from local broodstock are included. (Whitman, Deer Mountain and Tamgas hatcheries.)

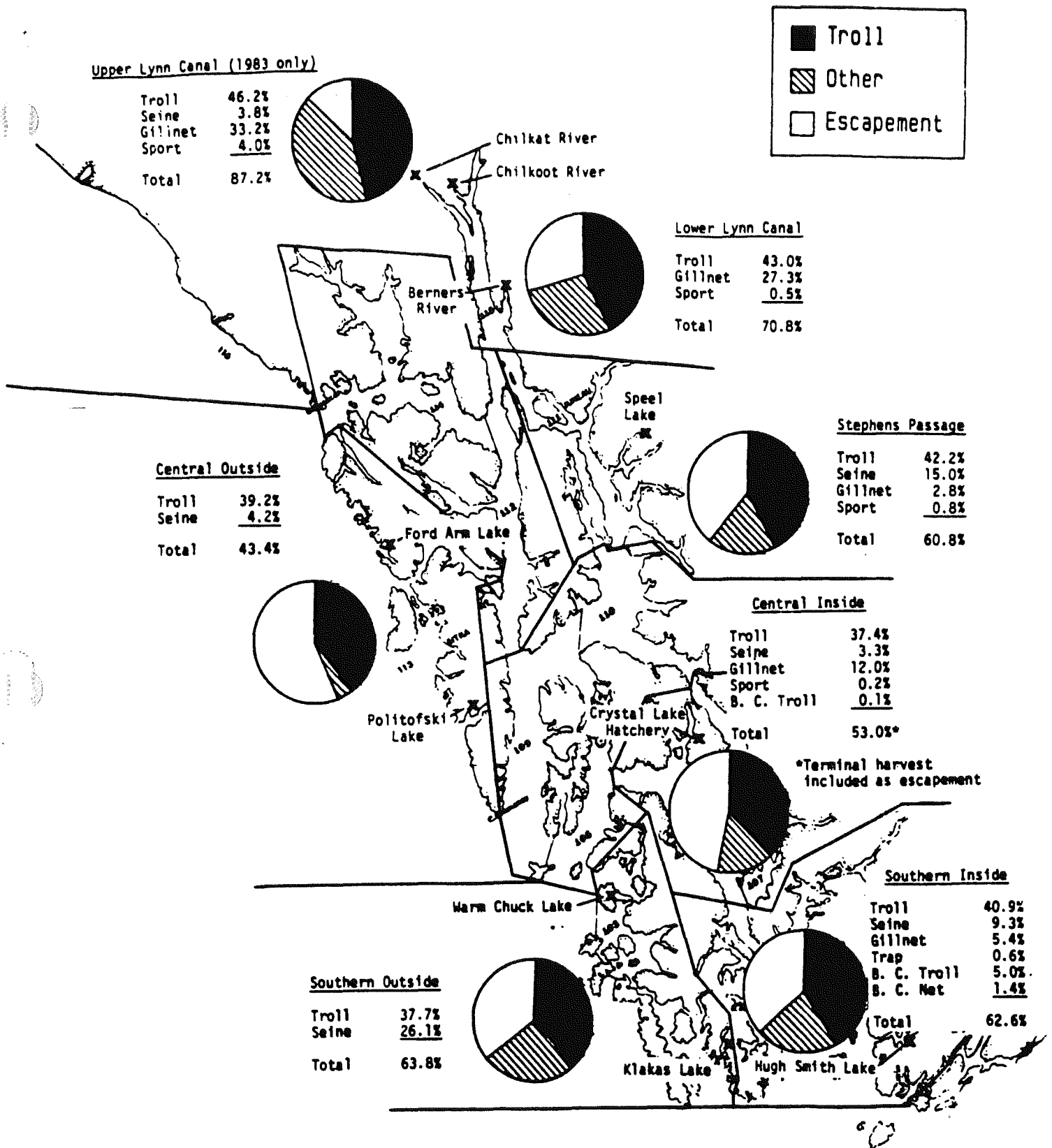


Figure 2-15. Average estimated harvest by gear type as a percentage of total coho salmon returns to selected systems in different management areas of Southeast Alaska, 1982-1983.