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**DISPERSAL OF STOCKED TROUT
IN FIVE WISCONSIN STREAMS**

By

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ABSTRACT

Brook trout stocked as fingerlings during early summer and during the fall remained near the stocking sites or tended to disperse a short distance above the stocking sites by the following spring. Yearling brook trout released in winter were concentrated 3 to 4 miles above the stocking site the following spring. Yearling brook trout released in March were distributed in a one-mile section below the stocking site within 10 days after release.

Brown trout stocked as fingerlings during early summer and during the fall remained near the stocking sites or dispersed upstream from the stocking sites by the following spring. Yearling brown trout released during January were distributed above and below the stocking sites, but were concentrated at the stocking sites the following April. Out of six stocks of yearling brown trout released during March, four had greater dispersal downstream than upstream from the area of release and two had greater dispersal upstream than downstream a week to a month after release.

Various strains of rainbow trout stocked as fingerlings during early summer and during the fall remained near the stocking sites the following spring. Yearling fall-hatched rainbow trout released in March were concentrated at the stocking sites and had only limited dispersal upstream and downstream from the stocking sites 3 to 4 weeks after release.

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INTRODUCTION

Loss of stocked trout from a section of stream can be a serious management problem when the stocked trout disperse and establish residence in sections of a stream flowing through land posted with "no trespass" signs. However, this loss might be decreased if stocking sites were selected in anticipation of the dispersal patterns of the trout when they are released at different times of the year. To determine the extent of dispersal of stocked trout, data were collected on 57 different stocks of brook, brown and rainbow trout during studies on survival and growth of stocked hatchery-reared trout in Wisconsin streams. Results of those studies were reported by various investigators (Brynildson and Christenson, 1961; Brynildson and Degurse, 1963; Brynildson et al, 1966; Mason et al, 1966 and 1967).

DESCRIPTION OF STREAMS

The streams stocked were Big Roche-a-Cri Creek, Adams-Waushara Counties; Black Earth and Mt. Vernon Creeks, Dane County; Trout Creek, Iowa County; and McKenzie Creek, Polk County.

Sections of Big Roche-a-Cri and McKenzie Creeks in which trout were stocked had sand-muck bottoms and relatively deep, slow-flowing water that was ice covered during the winter. Bank and in-stream cover was good all year. Sections of Black Earth, Mt. Vernon and Trout Creeks in which trout were stocked had rubble and silt bottoms and relatively deep, slow-flowing water that was generally ice free during winter. Bank and in-stream vegetation was mainly sedges, grasses, water cress and water buttercup, which offered good cover only during the summer. Relatively low densities of resident wild trout, approximately 20 pounds per acre, were present in all these sections of the five streams.

METHODS

Trout Stocking

Stocked trout were from the production stock of brown and rainbow trout reared at Nevin Hatchery, Madison, Wisconsin, and from experimentally reared brook, brown and rainbow trout from Westfield Research Hatchery, Westfield, Wisconsin. One group of wild brook trout was hatched and reared in the headwaters of Big Roche-a-Cri Creek.

Trout stocked were marked for future identification by removal of either the adipose, a ventral or a pectoral fin, and in some stocks a combination of adipose and a ventral or a pectoral fin.

Trout were stocked as yearlings during the winter and spring and as fingerlings during early summer and during the fall. Most of the trout released were scatter-planted from floating live-boxes within sections of the

five streams. A small number of the stocks was spot-planted at selected sites. The group of wild brook trout hatched and reared in the headwaters of Big Roche-a-Cri Creek was collected by electrofishing and released with the hatchery-reared trout 5 miles below the headwaters.

Electrofishing

Trout population estimates based on electrofishing were made in April just before the opening of the trout fishing season and in September just after the trout fishing season closed. At every station on the streams the trout captured were identified. (Stations were mainly 300 yards apart.) Only the number of trout captured on the first run with the electric shocker were used to show the distribution in a given stream at a given time.

Efficiency of capturing trout 6 to 10 inches in total length during the first run with the 230-volt, 2500-watt direct-current electric shocker was calculated to be 60 to 90 percent by the formula:

$$\frac{R}{R + U}$$

where R = number of trout recaptured during the second run of the electric shocker, and

U = number of unmarked trout captured during the second run of the electric shocker.

RESULTS

Brook Trout

Dispersal of brook trout after their release into streams is presented graphically in Figures 1-9.

With the exception of one stock of domesticated brook trout (Fig. 7) released in Black Earth Creek, January 9, 1957, and another stock (Fig. 8) in Big Roche-a-Cri Creek, March 18, 1959, the brook trout remained near the stocking sites or tended to disperse a short distance above the stocking sites by the following spring (Figs. 1-6 and 9). Upstream dispersal was especially evident of trout stocked during the fall in Big Roche-a-Cri (Fig. 3), Black Earth (Fig. 5), and Mt. Vernon (Fig. 6) Creeks and during the winter in Black Earth Creek (Fig. 7) when water temperatures were near freezing but water levels were at or near January base flow.

There was sharp contrast in dispersal of brook trout from the same hatchery stock when released as fingerlings in October and as yearlings during mid-March in Big Roche-a-Cri Creek (Fig. 8). The greatest portion of the stock released in March was distributed up to a mile and more below the stocking site within 10 days after release; whereas, the stock released in October was collected mainly near the stocking site and upstream in late March and early April following the stocking dates. The domesticated brook trout released as fingerlings June 14, 1960, in Mt. Vernon Creek tended to disperse upstream from the stocking area and their distribution by September, 1960, was apparently established because it was similar in April, 1961 (Fig. 9).

Dispersal was similar in two groups of domesticated brook trout, one reared on a complete dry diet and the other on a dry diet plus fresh meat before release into Black Earth and Big Roche-a-Cri Creeks (Figs. 2 and 3). Moreover, there was no observable difference in distribution of stocked hatchery-reared domesticated brook trout, hatchery-reared Lawrence Creek wild strain and stream-reared Roche-a-Cri Creek wild strain (Fig. 4). No difference was noted in distribution of hatchery-reared trout of various degrees of wildness half a year after release into Black Earth and Mt. Vernon Creeks (Figs. 5 and 6).

Brown Trout

Dispersal of brown trout after release into streams is presented graphically in Figures 10-33.

Brown trout fingerlings released in the fall remained near the stocking sites or had dispersed upstream from the stocking sites by the following spring (Figs. 10-17 and 20-22). Investigations showed that this dispersal upstream from the stocking area had not occurred within three weeks after release of a stock into Black Earth Creek (Fig. 11). Moreover, another investigation showed that fall-stocked brown trout fingerlings in Big Roche-a-Cri Creek had retained the same distribution pattern in the fall that they had the previous spring (Fig. 12).

Brown trout yearlings released in Black Earth and Mt. Vernon Creeks during late January, when water temperatures were below 42° F but water level was near or at January base flow, were distributed mainly at the stocking sites the following April, although some dispersal occurred below and above the stocking sites (Figs. 18 and 19). The highest concentrations beyond the stocking sites were in sections of stream with ground water discharge and highest winter water temperatures.

Although the brown trout stocked as yearlings during mid- and late March were concentrated at or near the stocking sites a week to more than a month later, four out of six stocks had greater dispersal downstream than upstream (Figs. 20-23 and 25). Exceptions to this dispersal pattern were stocks of yearling brown trout in Black Earth Creek and those stocked at station 9 in McKenzie Creek (Figs. 23-24) which one week after release had moved upstream in greater numbers than downstream, but with a tendency to concentrate at or near the stocking sites.

Like the fall-stocked brown trout fingerlings, the ones released in late May and early June tended to disperse upstream (Figs. 26-28, 31 and 33). Their distribution, like that of the brook trout fingerlings stocked in Mt. Vernon Creek in June (Fig. 9), was fairly well established by September because it was similar the following April (Figs. 26-27) or only a few hundred yards upstream (compare Figs. 29-30 and 31-32). The one exception to the upstream dispersal pattern occurred with a stock of fingerlings released June 14, 1962, in Black Earth Creek. These trout were scatter-planted in a 1.7-mile section and were distributed mainly in that section the following September (Fig. 29). These trout had moved generally upstream by the following April (Fig. 30).

Before a detention dam was constructed on Trout Creek at station 19, brown trout stocked between stations 5 and 10, May 20, 1963, moved upstream to station 29 by the following September (Fig. 26). After the dam was constructed late in 1963, the fingerling brown trout stocked below the dam in 1964 and 1966 (Figs. 27 and 28) were apparently unable to swim through the 200-foot tube passing water at 3 to 4 feet per second. As yearlings in April, 1965, only two trout of the May, 1964, stock were found at station 21 above the detention dam (Fig. 27).

Dispersal of brown trout reared on a dry diet and those reared on a dry diet plus fresh meat was mainly upstream in Trout and Mt. Vernon Creeks (Figs. 16 and 17); however, the former were relatively more numerous than the latter at the upper section of the trout water in both streams.

Rainbow Trout

Dispersal of rainbow trout after release into streams is presented graphically in Figures 24-25 and 29-42.

Most rainbow trout fingerlings released in the fall remained near the stocking sites or had dispersed upstream more than downstream by the following spring (Figs. 30, 32, 34 and 39). Two stocks of fall-hatched trout were concentrated at the stocking site but more were present below than above the site (Fig. 35). Two groups of spring-hatched yearling trout released in the fall remained near the stocking sites two weeks after release, but one of these groups dispersed above and below the stocking site while the other group remained near the stocking site the following April (Figs. 36 and 37). Two stocks, one the spring-hatched and the other the Donaldson strain, were distributed below and above the stocking site but were concentrated at the stocking site the following spring (Fig. 38).

The two stocks of yearling fall-hatched rainbow trout released during March in Black Earth and Mt. Vernon Creeks were concentrated mainly at the stocking sites 3 to 4 weeks after release (Figs. 24 and 25), although more of the trout had dispersed downstream than upstream in Mt. Vernon Creek.

Two groups of fall-hatched rainbow trout fingerlings, one stocked in Big Roche-a-Cri Creek and the other in Black Earth Creek, dispersed more upstream than downstream from the stocking area from June to September (Figs. 40 and 41). Similar groups of fall-hatched rainbow trout fingerlings released in Mt. Vernon Creek dispersed more downstream than upstream from the point of release during early summer to early fall (Figs. 31 and 33). A group of spring-hatched fingerlings tended to move more upstream than downstream (Fig. 31) during the same period.

The rainbow trout dispersal patterns, unlike those of the brook and brown trout fingerlings stocked during late May and June, were apparently not established by September because the rainbow trout tended to shift their distribution upstream (Figs. 30 and 41-42) or upstream and downstream (Fig. 32) by the following April. An exception to the upstream or downstream dispersal pattern during their first summer in a stream was the distribution of a stock of fall-hatched rainbow trout fingerlings that were scatter-planted, June 14, 1962, in a 1.7-mile section of Black Earth Creek. Like their brown trout counterparts, these rainbow trout were concentrated in the stocking area the following September (Fig. 29), but had shifted their concentration several hundred yards upstream by the following April (Fig. 30). Only one stock of rainbow trout (the spring-hatched strain) released in June in Black Earth Creek was found at higher concentrations below the stocking area than at or above the stocking area the following September (Fig. 42); however, this stock too was distributed at or just above the stocking area (Fig. 42) by the following April.

Dispersal of fall-hatched rainbow trout reared on a dry diet and those reared on a dry diet plus fresh meat was similar after 6 months in Big Roche-a-Cri Creek (Fig. 35).

Whenever brown and rainbow trout were released together in the same stocking area of a stream, their distribution was similar a month later (Figs. 24-25) and 4 to 10 months later (Figs. 29-31), but dissimilar 10 months later in Mt. Vernon Creek (Fig. 32) where the brown trout were more concentrated above the stocking area than the rainbow trout.

There was no difference in dispersal of stocked fingerling rainbow trout of the fall- and spring-hatched strains (Fig. 31) during their first summer in Mt. Vernon Creek, but after a winter in the stream the fall-hatched strain had dispersed upstream and downstream, whereas the spring-hatched strain had dispersed more upstream than downstream from the stocking area (Fig. 32).

DISCUSSION

Water Temperature

Results of studies by Cooper (1952) and Newell (1958) indicated that water temperature of streams when trout were stocked influenced dispersal of the trout above and below the stocking sites. Cooper observed that when water temperatures were 55° to 75° F at time of stocking, brook, brown and rainbow trout remained concentrated near the stocking sites, but brook and rainbow trout exhibited strong tendencies toward downstream movement when stocked in water temperatures of 42° to 45° F. Newell concluded that brook and rainbow trout exhibited a strong tendency to move downstream when stocked in waters less than 50° F, but when the water temperatures were above 50° F both trout species remained in the immediate vicinity of stocking. an Millis and Kanaly (1958) observed that a high percentage of catchable brown and rainbow trout stocked during the fall and spring remained near the point of release but that both trout species showed a somewhat equal tendency to move downstream rather than upstream in the Big Laramie River, Wyoming. Butler and Borgeson (1965) reported that fall- and spring-spawned rainbow trout released during the fall in a California stream were recovered by anglers 6 months later within 1/4 mile of the stocking sites. They also reported that another stock of rainbow trout was released in the fall when the water temperature was 47° F. By electrofishing and draining of the study area five days later, all trout were recovered and 84 percent were recovered at the stocking site; none were recovered downstream; hence, in that instance cold water temperatures did not result in downstream movement of consequence.

Movement of brook and brown trout downstream occurred in Big Roche-a-Cri when the brook and brown trout yearlings were stocked in mid-March (Figs. 8 and 22). Water temperature ranges are not available for the week when the brook trout were stocked, but temperatures ranged from 37° to 58° F at the stocking sites the following week. Mid-March is generally a period of snow-melt (and cold water temperatures) and high water levels in Big Roche-a-Cri Creek. The yearling brook trout released January 9, 1957, in Black Earth Creek entered an environment of January base flow water levels, but cold water temperatures. (Water temperatures are not available for January, 1957, but the water temperatures ranged from 34° to 42° F during early January, 1955-56 at the stocking site.) These trout were more concentrated 3 and 4 miles above the stocking site than at the stocking site the following April (Fig. 7). Abundant ground water discharge 2 to 5 miles above the stocking site may have been detected by the brook trout and preferred, hence

the upstream movement in Black Earth Creek. Possibly any warm ground water influence in Upper Roche-a-Cri Creek was suppressed by the cold water from melting snow during March, so that the brook trout could not detect its influence and drifted with the high, cold water downstream.

The yearling brown trout released during January in Mt. Vernon and Black Earth Creeks dispersed upstream as well as downstream but were concentrated at the stocking site the following April (Figs. 18 and 19). When these trout were released in Mt. Vernon and Black Earth Creeks, the respective water temperatures were 41° and 33° F and the water levels were at January base flow and stable.

Water Temperature and Level

Evidence that high water levels plus low water temperatures are combining factors causing downstream movement by stocked yearling brown trout (Figs. 22 and 25) and yearling rainbow trout (Fig. 25) may perhaps be found in Big Roche-a-Cri and Mt. Vernon Creeks. In Big Roche-a-Cri Creek, the March 23, 1959, stock of yearling brown trout was released on a day when the water temperature at the stocking site ranged from 38° to 59° F. By March 26, the range was 38° to 44° F because of the spring runoff due to melting snow. By March 27, when electrofishing began, the water level had dropped, and the water temperature range on March 27 at the stocking site was 37° to 59° F. The downstream dispersal of the brown trout had occurred during the period of cold water temperatures combined with high water levels. Mt. Vernon Creek received a stock of yearling brown and rainbow trout the same day as Black Earth Creek, March 15, 1956. (The respective water temperatures in Mt. Vernon and Black Earth Creeks were 46° and 42° F; respective water temperature ranges, March 15-23, at the stocking areas were 34° to 48° F and 41° to 52° F.) When electrofishing occurred on Black Earth Creek during late March of 1956 and before the cold and high runoff, only a few brown and rainbow trout were present below the stocking area (Fig. 24). When electrofishing occurred on Mt. Vernon Creek in early April, 1956, after the cold spring runoff, both brown and rainbow trout of the March 15 stock had dispersed more downstream from the stocking area than upstream (Fig. 25). A combination of high water levels and low water temperatures may have caused some of the trout to drift with the strong, cold current because their physical activity was slowed by the cold environment.

Density

Hunt (1965) reported an increase in dispersal of wild brook trout fingerlings with an increase in fingerling density. In our study, the only stocks that were relatively large were composed of 5,000 brown, and 5,000 fall-hatched (Fig. 29) and 10,000 spring-hatched rainbow fingerlings (Fig. 42) released in Black Earth Creek in June. When compared with a stock of 4,000 fall-hatched rainbow trout fingerlings released in June (Fig. 41), there is no observable difference in extent of dispersal from the stocking site, except the tendency for the spring-hatched rainbows to have dispersed more downstream than upstream from the stocking site (Fig. 42) during their first summer in the stream. However, these same trout were distributed to a greater extent upstream than downstream from the stocking area the following April. This distribution was similar to the stocks of 4,000 fall-hatched rainbow trout (Fig. 41), 3,000 fall-hatched rainbow trout (Fig. 39), 5,000 brown, 1,000 fall-hatched and 5,000 spring-hatched rainbow trout (Fig. 32), and 1,500 fall-hatched rainbow trout (Fig. 34).

Although the brown and fall-hatched rainbow trout released May 20, 1963, in Mt. Vernon Creek tended to disperse upstream and downstream, respectively, during the summer, most remained at or near the stocking area (Fig. 33). Between stations 13 and 15, where the concentration of rainbow trout fingerlings was the highest, the stocked rainbow trout fingerlings exhibited slower growth from time of stocking to the following September. The fingerlings below station 15 averaged 7.2 inches and the fingerlings between stations 13 and 15 averaged 6.1 inches in total length. Their brown trout counterparts were concentrated between stations 16 and 17 where their total length averaged 6.2 inches. Above and below stations 16 and 17, this stock of fingerlings averaged 6.4 and 6.5 inches, respectively, in September. Although relatively slower growth is an indication of competition in food-rich Mt. Vernon Creek, most of the fingerlings remained where released.

Ground Water Discharge

The influence of ground water discharge above station 5 at Mt. Vernon Creek holds the water temperature at and above 40° F except during the spring snow-melt runoff when it may drop to 33° F. The water in this stream is ice covered from station 12 downstream during the winter. The yearling spring-hatched strain of rainbow trout released during the fall at station 5 was distributed mainly at the release point the following April (Fig. 36). Their counterparts released between stations 13 and 14, although concentrated at the release point, had dispersed upstream and downstream from the release point (Fig. 37). The environment was uniformly cold below station 12 during the winter, and movement could have been less restricted by temperature gradients. The average winter water temperature at station 7, only 940 yards below station 5, was 2° F below the average at station 5. This small difference in average winter water temperatures may have been sufficient for the trout to detect and to avoid, hence the limited dispersal was more upstream from the stocking site than downstream.

Cover

Available cover may be a contributing factor in concentrating stocked trout in a given section of stream. The brush composing the dike of an old beaver dam at station 5 on McKenzie Creek contained a relatively heavy concentration of yearling brown trout released at stations 3 and 9 (Fig. 23). In this instance, trout from both stocks had moved upstream and downstream from the stocking sites but those stocked at station 3 were more concentrated at station 5 downstream than at the stocking site a week after release.

SUMMARY AND MANAGEMENT IMPLICATIONS

1. Brook and brown trout fingerlings stocked during early summer and during the fall tended to disperse upstream, and with few exceptions were concentrated at or near the stocking sites. Insignificant numbers of these trout dispersed as much as one mile upstream and a half-mile downstream from points of release. Therefore, the present policy of stocking brook and brown trout fingerlings a half-mile upstream from posted stream banks is valid; however, these fingerlings should not be released less than a mile downstream from posted stream banks. Rainbow trout fingerlings stocked during early summer and during the fall remained near the stocking sites and had only limited dispersal upstream and downstream by the following spring. Therefore, rainbow trout fingerlings can be stocked within a half-mile upstream or downstream of posted stream banks.

2. Brook trout yearlings stocked during January when the water temperatures were near freezing but water levels at January base flow, dispersed upstream from the stocking site; brown trout yearlings stocked during January moved upstream and downstream but were concentrated at the stocking sites.
3. Brook and brown trout yearlings stocked during mid- and late March generally had greater dispersal downstream than upstream from points of release. Cold water temperatures combined with high water levels appear to be the main cause of downstream dispersal of stocked yearling brook and brown trout. Brook and brown trout yearlings stocked when water is cold and high should be released at least a mile above posted stream banks. Because upstream dispersal is limited when water is high and cold, these trout can be released within a half-mile of posted stream banks upstream. Rainbow trout yearlings released in March were concentrated at the stocking sites and dispersal upstream and downstream was limited. Rainbow trout yearlings like fingerlings can be stocked within a half-mile upstream or downstream of posted stream banks.
4. One cannot depend on stocked trout to disperse to any extent from a given stocking site in streams. Whenever wide distribution of stocked trout is desired, scatter-planting should be employed.

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Figure 1: Dispersal of domesticated brook trout in Big Roche-a-Cri Creek between time of stocking as fingerlings September 25, 1957, and time of capture March 31--April 16, 1958.

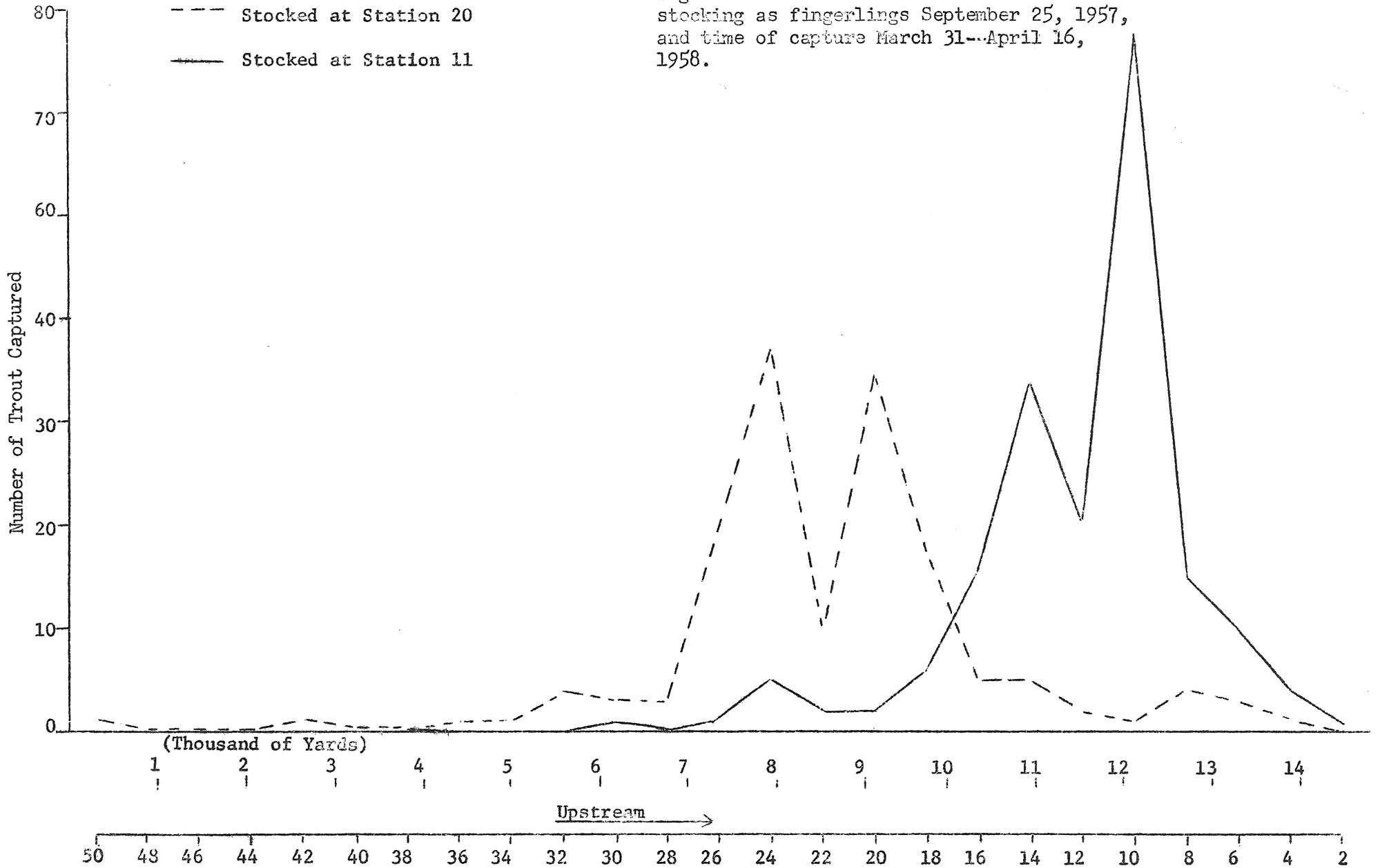
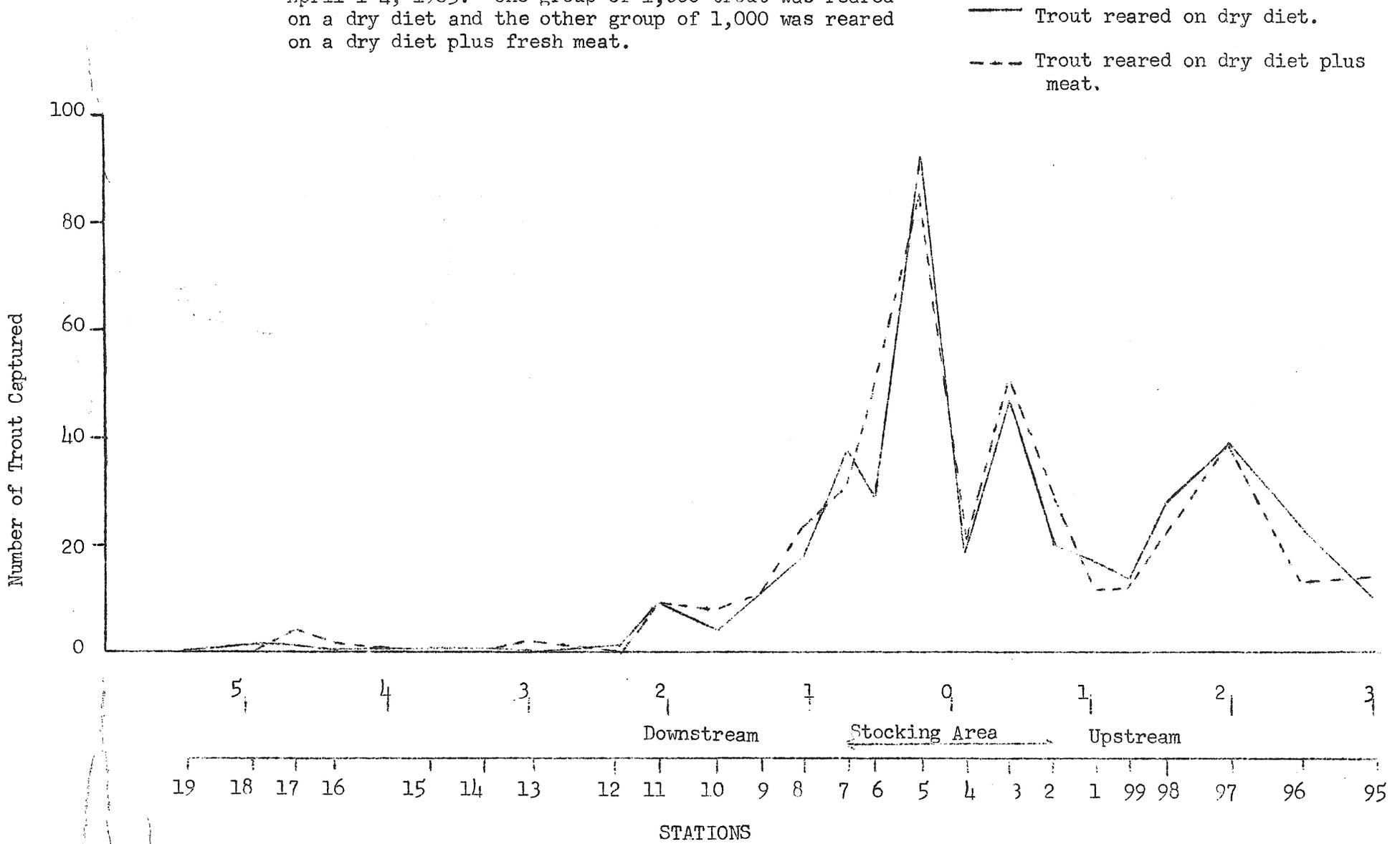


Figure 2: Dispersal of two groups of domesticated brook trout in Black Earth Creek between time of stocking as fingerlings September 19, 1962 and time of capture April 1-4, 1963. One group of 1,000 trout was reared on a dry diet and the other group of 1,000 was reared on a dry diet plus fresh meat.



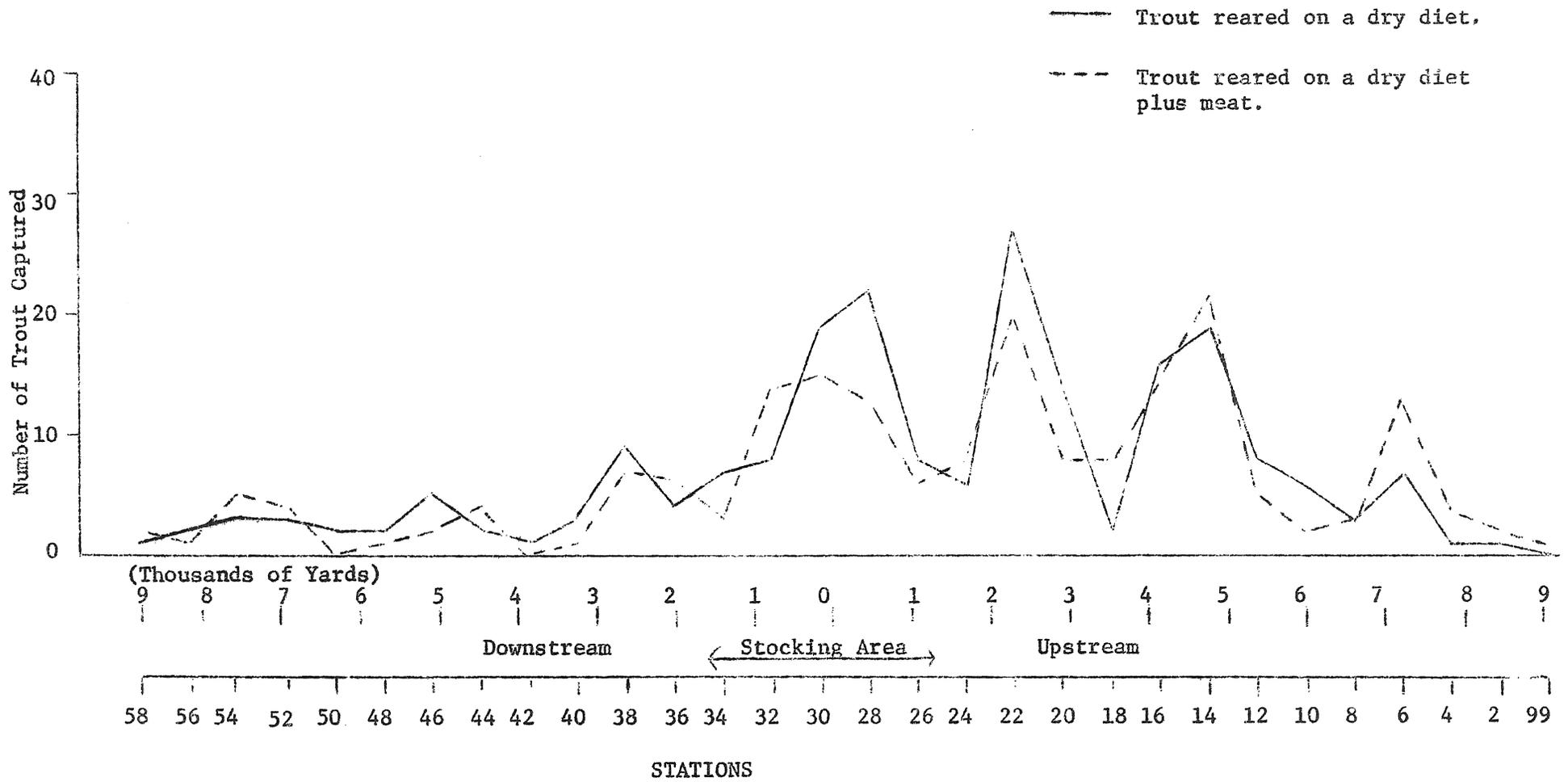
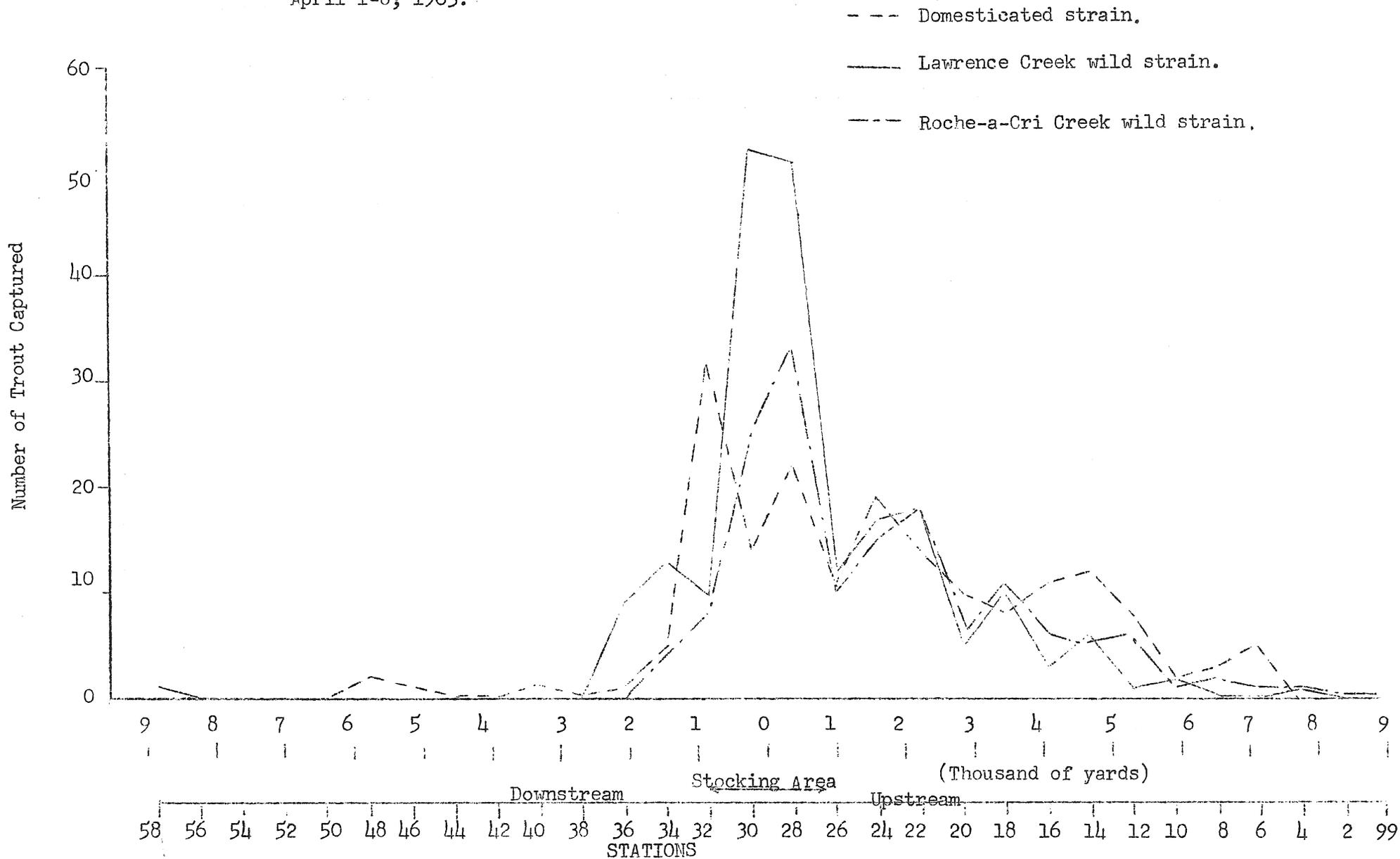


Figure 3 - Dispersal of two groups of domesticated brook trout in Big Roche-a-Cri between time of stocking as fingerlings October 20, 1962 and time of capture April 1-8, 1963. One group of 1,000 trout was reared on a dry diet and the other group of 1,000 was reared on a dry diet plus fresh meat.

Figure 4: Dispersal of three different strains of brook trout in Big Roche-a-Cri Creek between time of stocking as fingerlings October 20, 1962 and time of capture April 1-8, 1963.



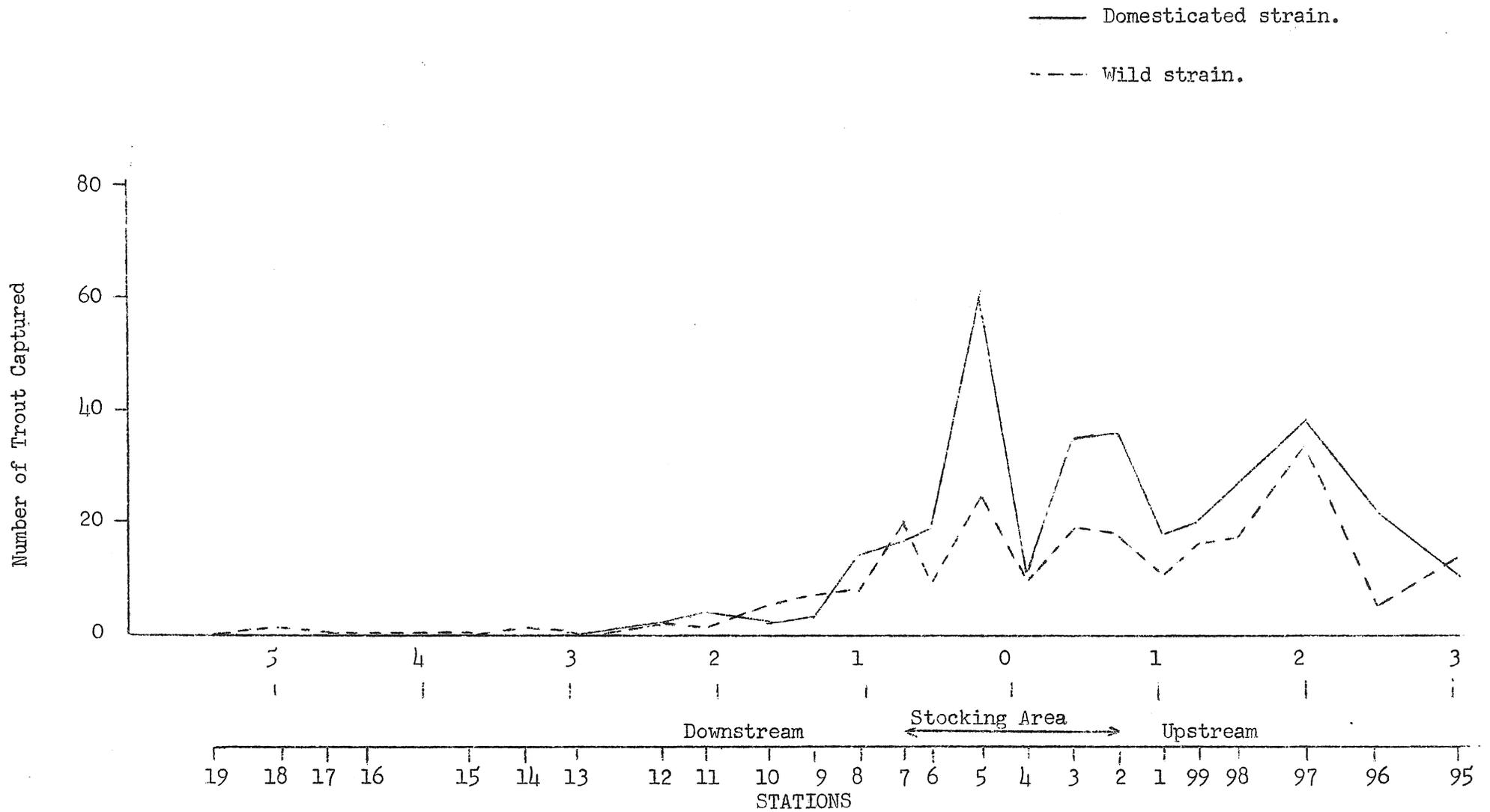


Figure 5: Dispersal of two different strains of brook trout in Black Earth Creek between time of stocking as fingerlings September 19, 1962 and time of capture April 1-4, 1963.

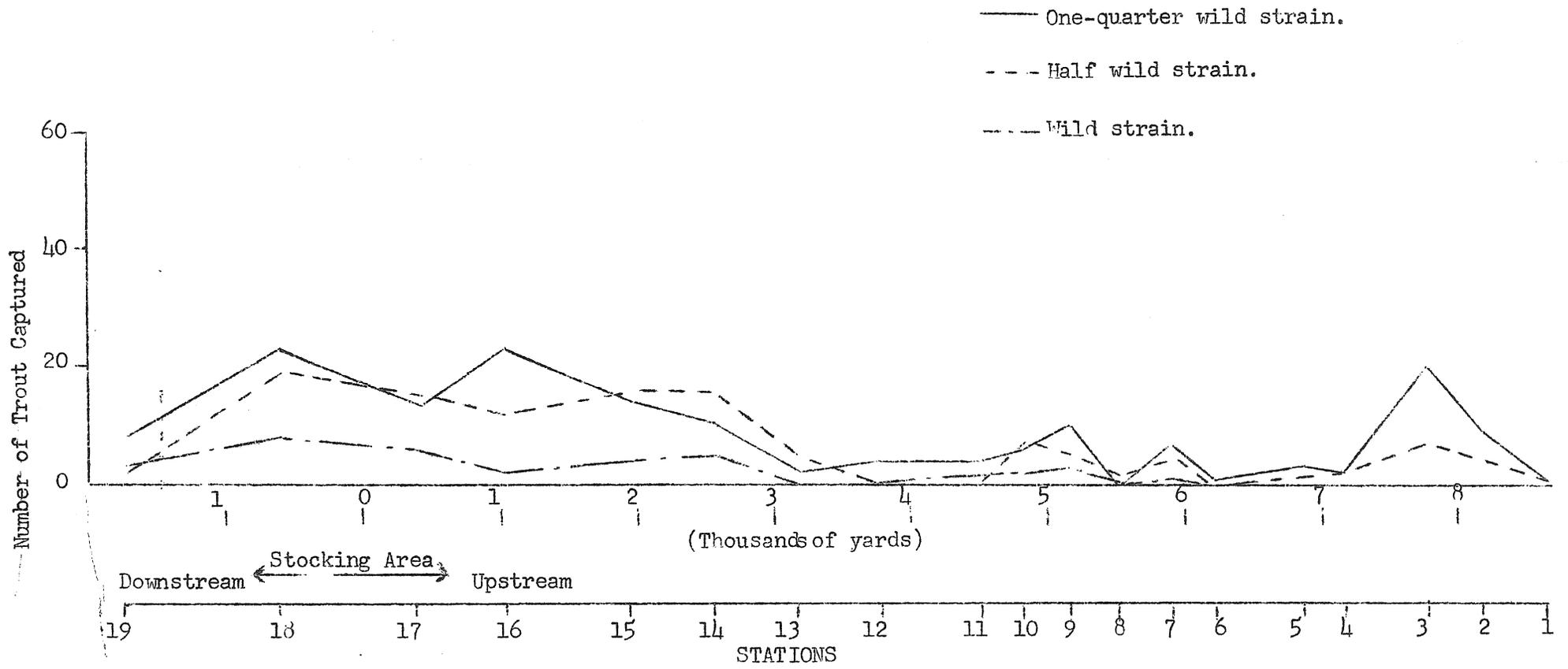


Figure 6: Dispersal of three different strains of brook trout in Mt. Vernon Creek between time of stocking as fingerlings October 12, 1964 and time of capture April 19-22, 1965.

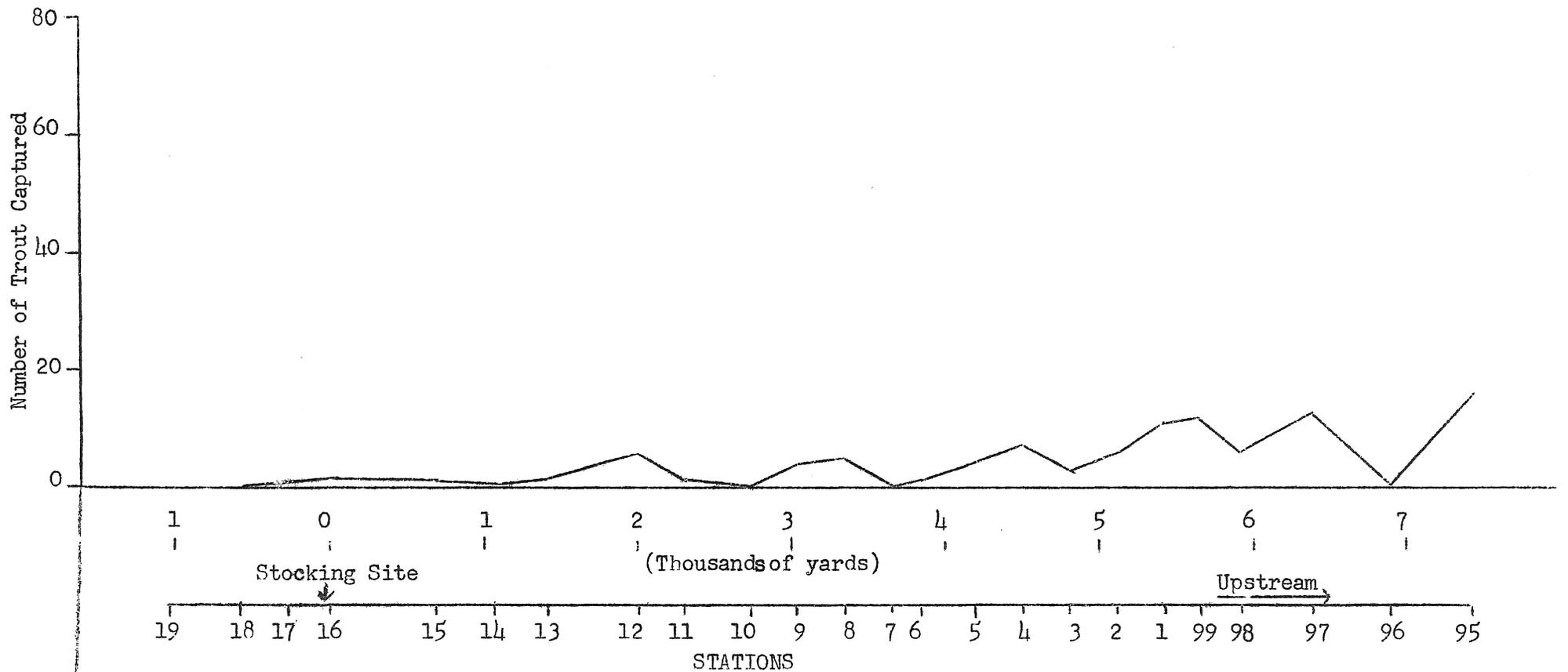


Figure 7: Dispersal of domesticated brook trout in Black Earth Creek between time of stocking as yearlings January 9, 1957, and time of capture April 22-29, 1957.

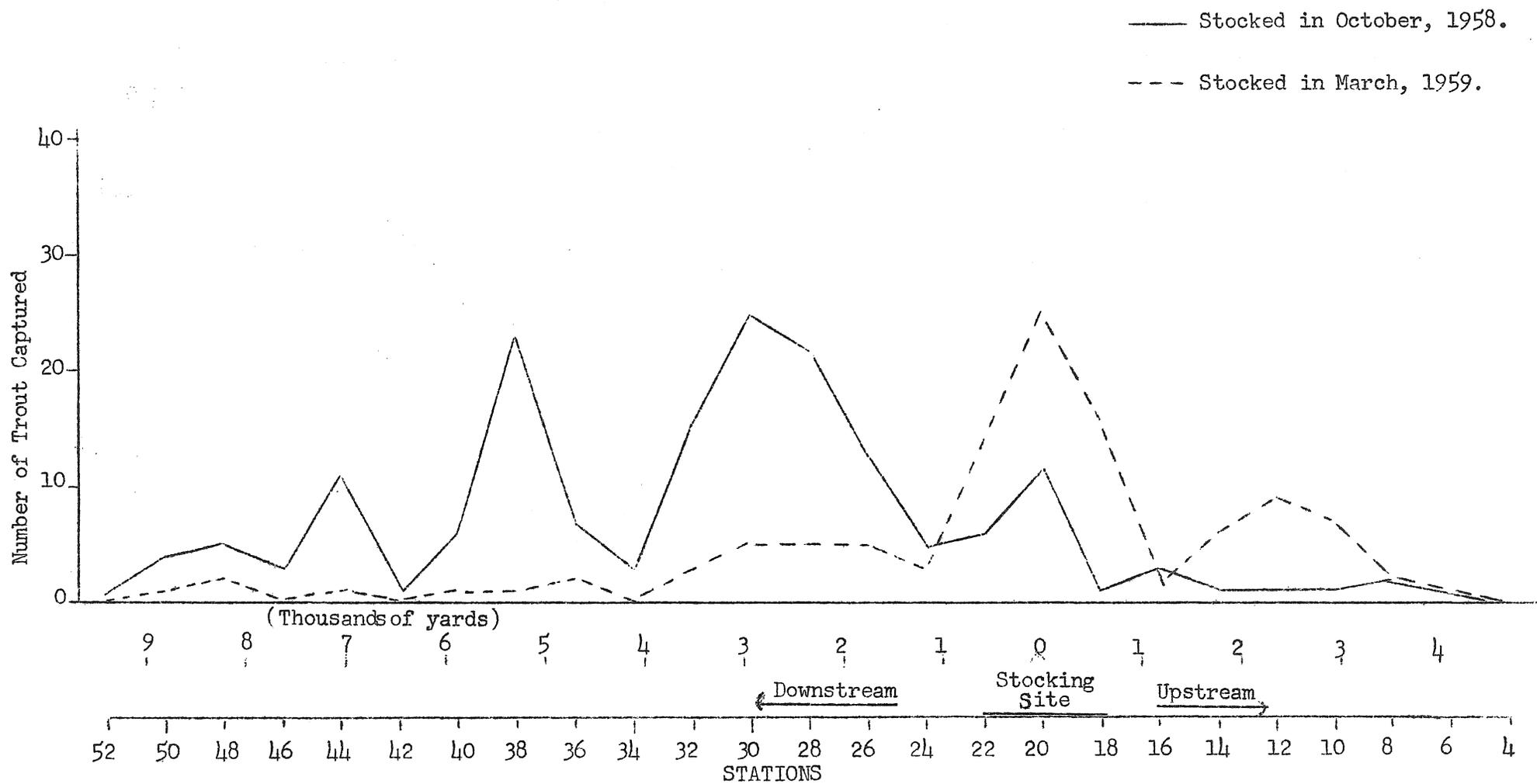


Figure 8: Dispersal of domesticated brook trout in Big Roche-a-Cri Creek between time of stocking as fingerlings October 13, 1958, and as yearlings March 18, 1959, and time of capture March 27--April 2, 1959.

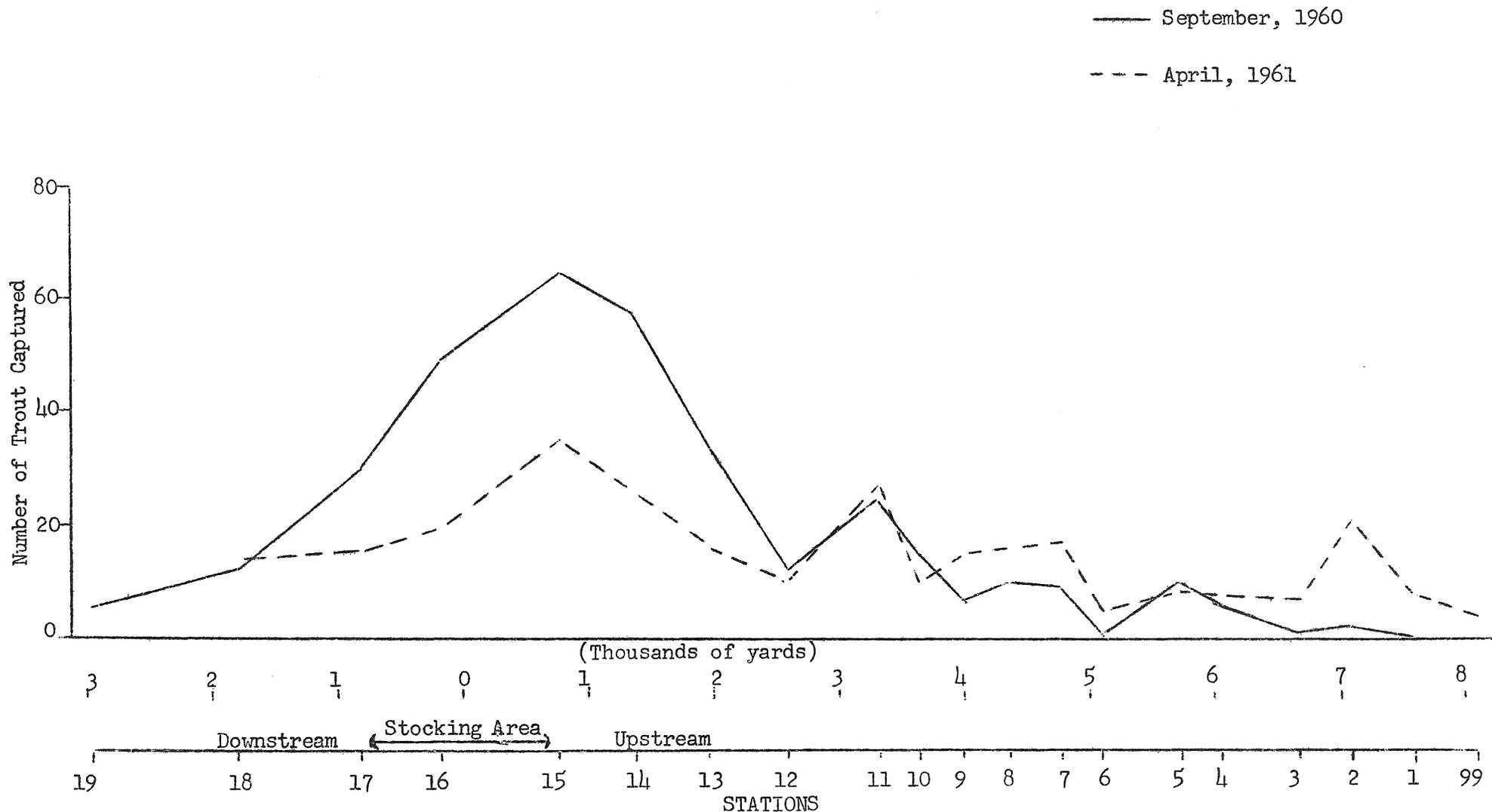


Figure 9: Dispersal of domesticated brook trout in Mt. Vernon Creek between time of stocking as fingerlings June 14, 1960, and time of capture September 27-29, 1960 and April 8-12, 1961.

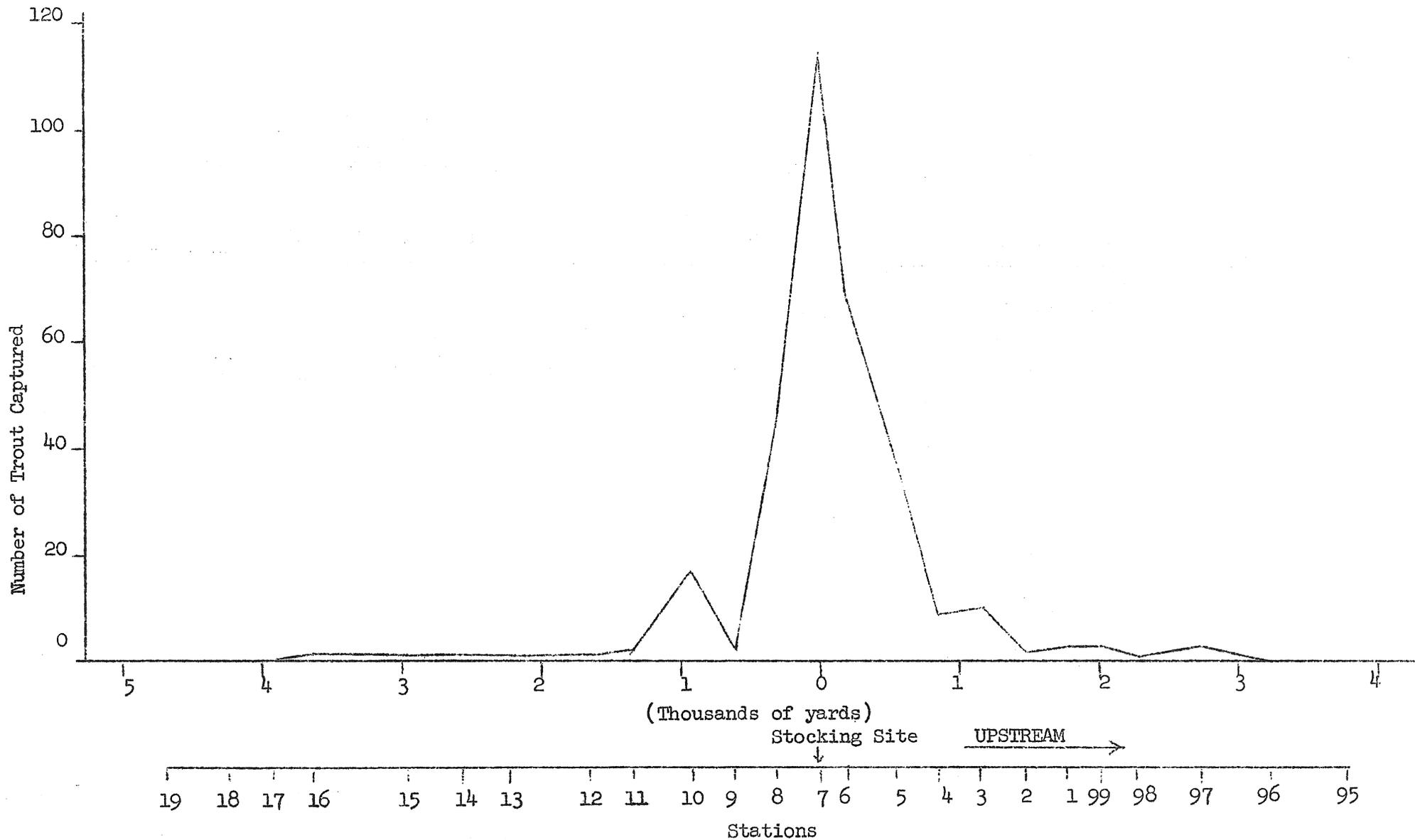


Figure 10: Dispersal of brown trout in Black Earth Creek between time of stocking as fingerlings October 23, 1956 and time of capture April 22-24, 1957.

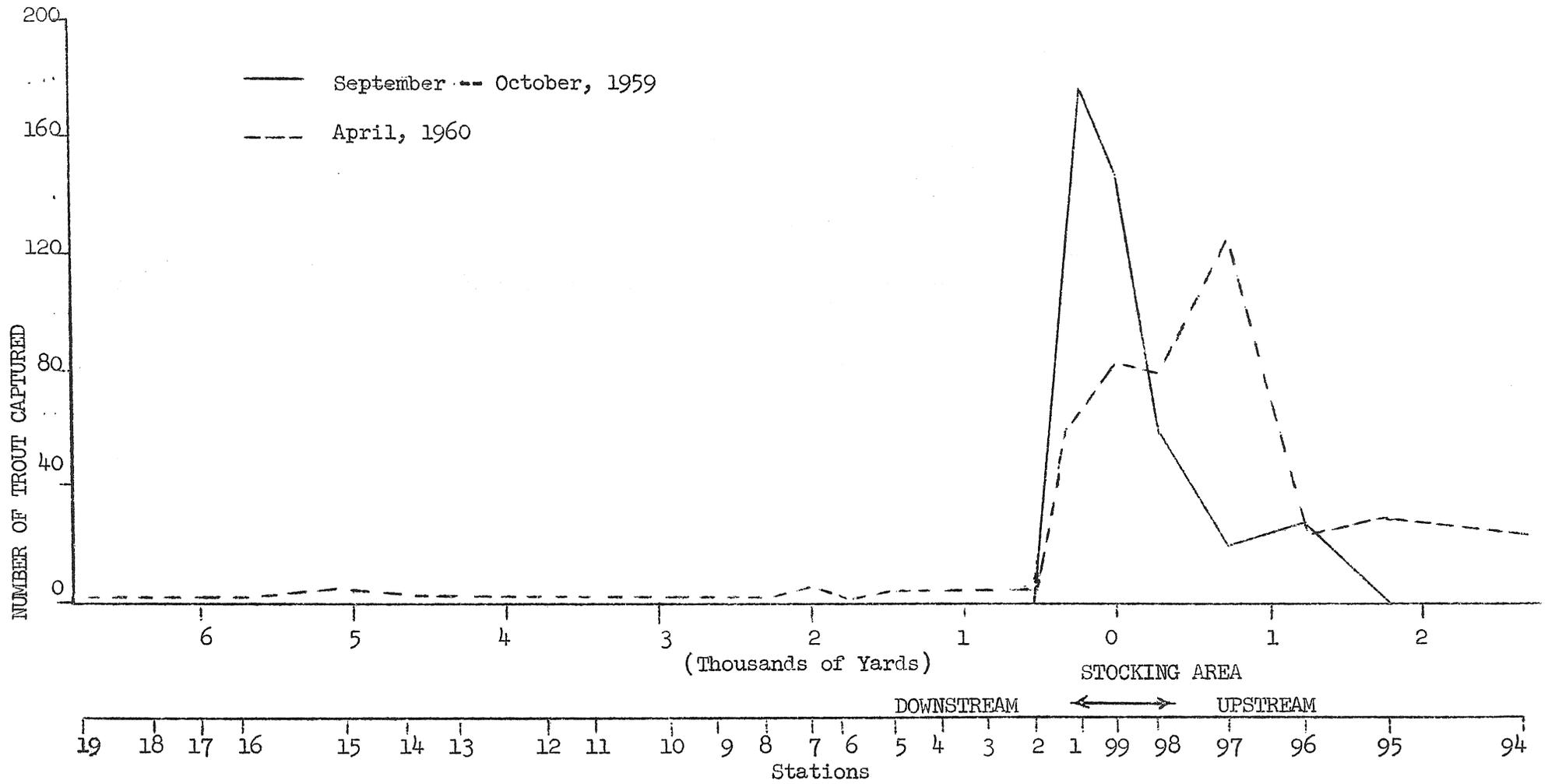


Figure 11: Dispersal of brown trout in Black Earth Creek between time of stocking as fingerlings September 8, 1959 and time of capture September 28 -- October 2, 1959 and April 11 - 14, 1960.

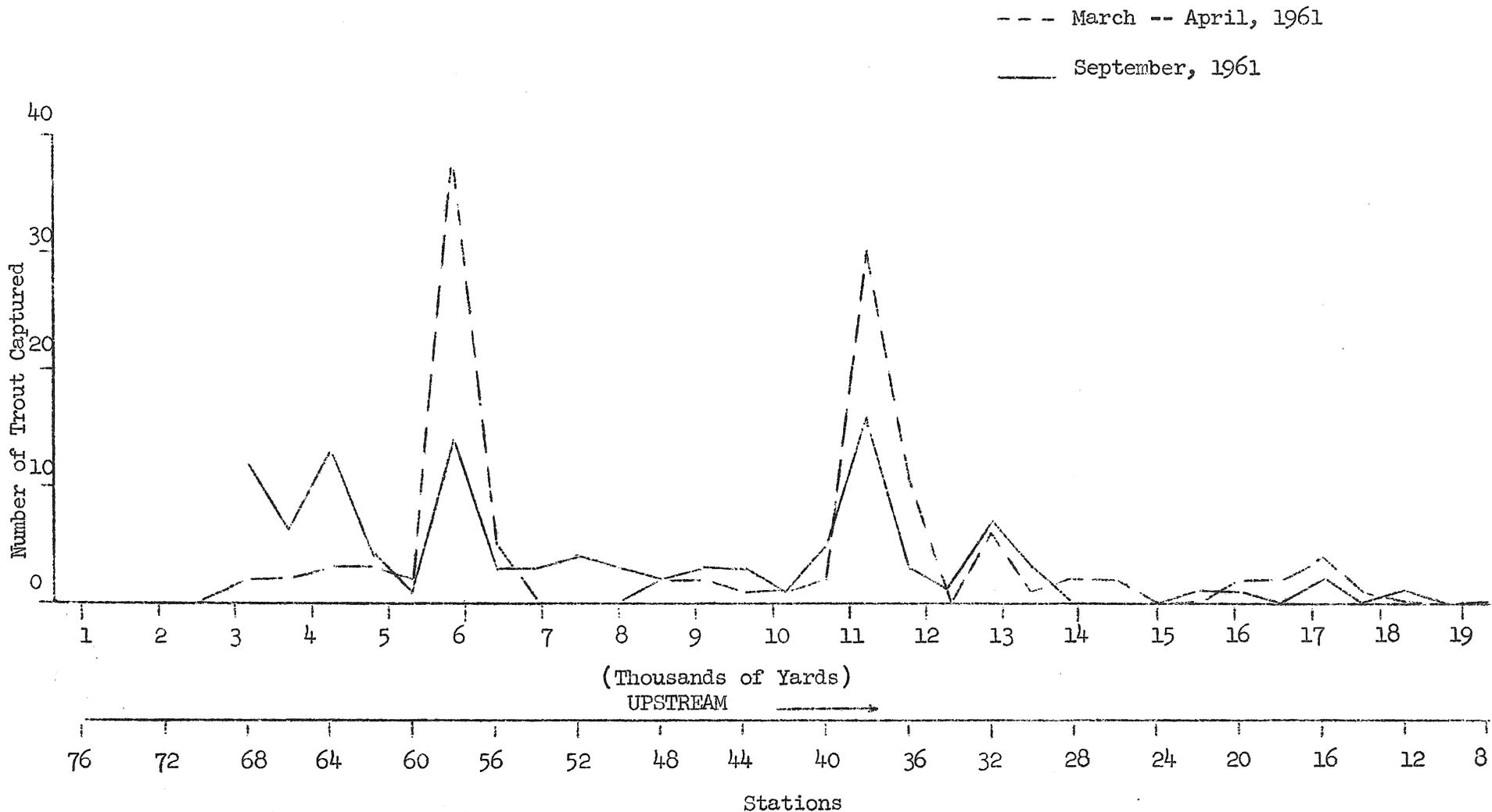
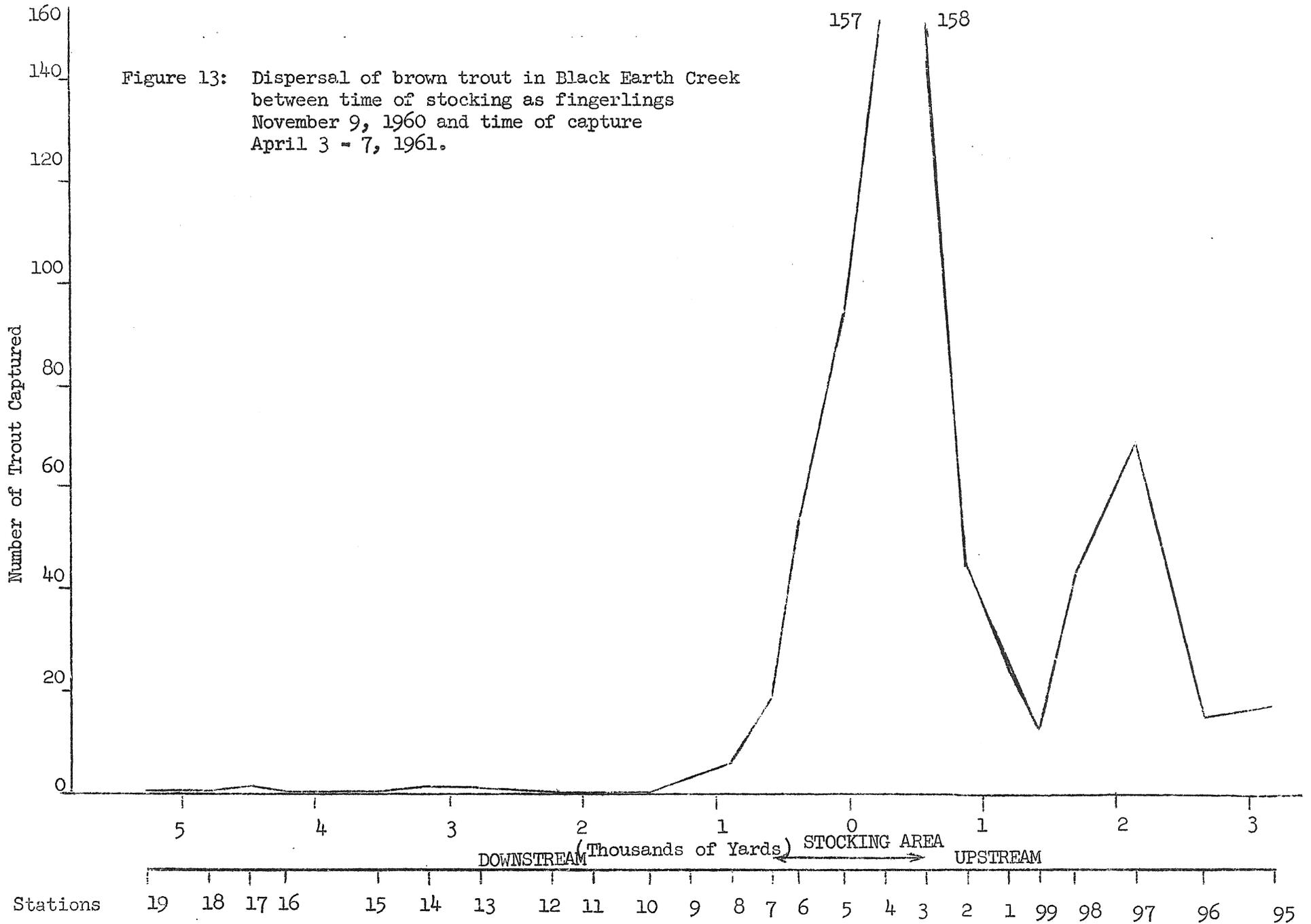


Figure 12: Dispersal of brown trout in Big Roche-a-Cri Creek from time of stocking as fingerlings September 30, 1960 and time of capture March 29 -- April 4, 1961 and September 15 - 22, 1961. Trout stocked at stations 38 and 58.

Figure 13: Dispersal of brown trout in Black Earth Creek between time of stocking as fingerlings November 9, 1960 and time of capture April 3 - 7, 1961.



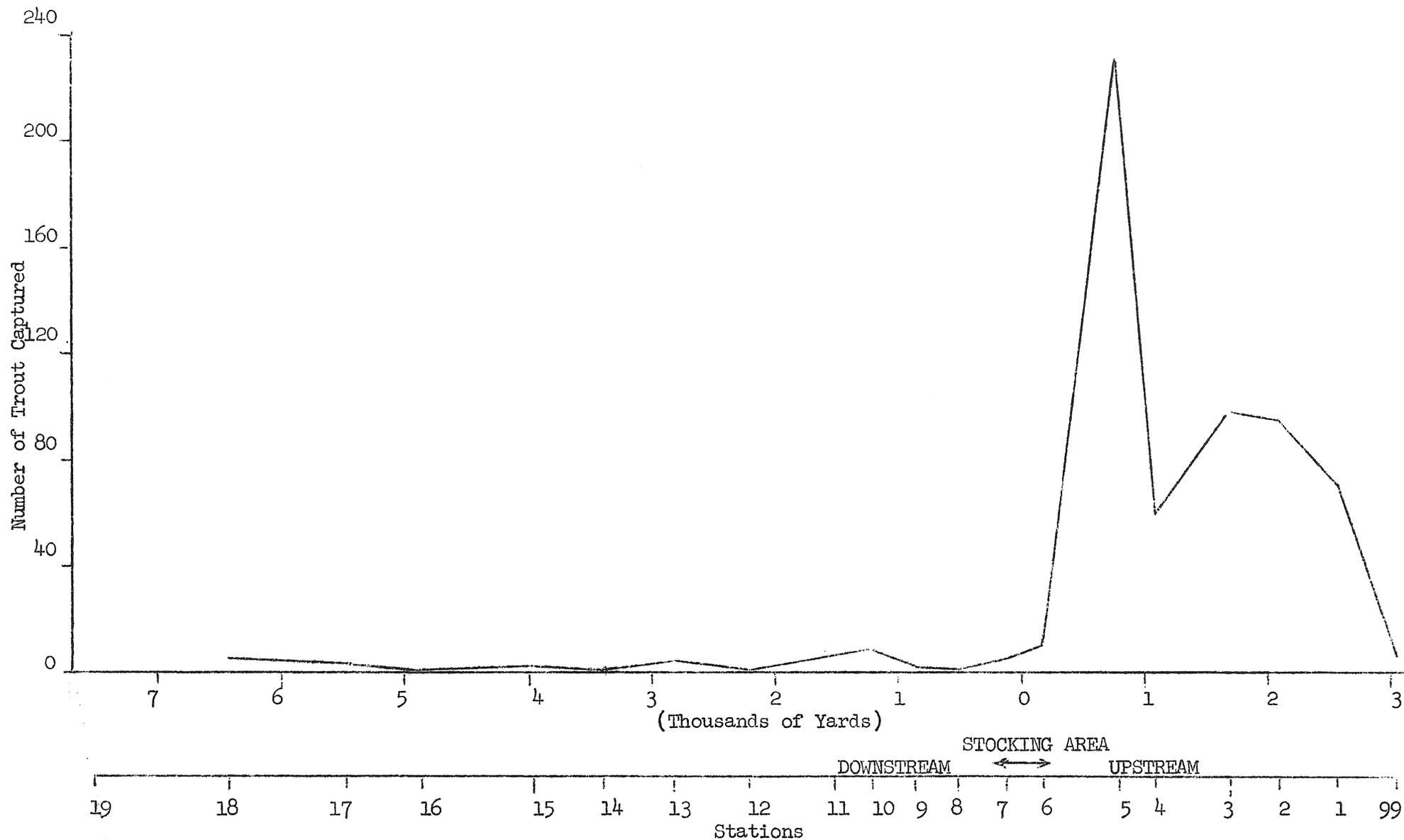


Figure 14: Dispersal of brown trout in Mt. Vernon Creek between time of stocking as fingerlings November 9, 1960 and time of capture April 8 - 10, 1961.

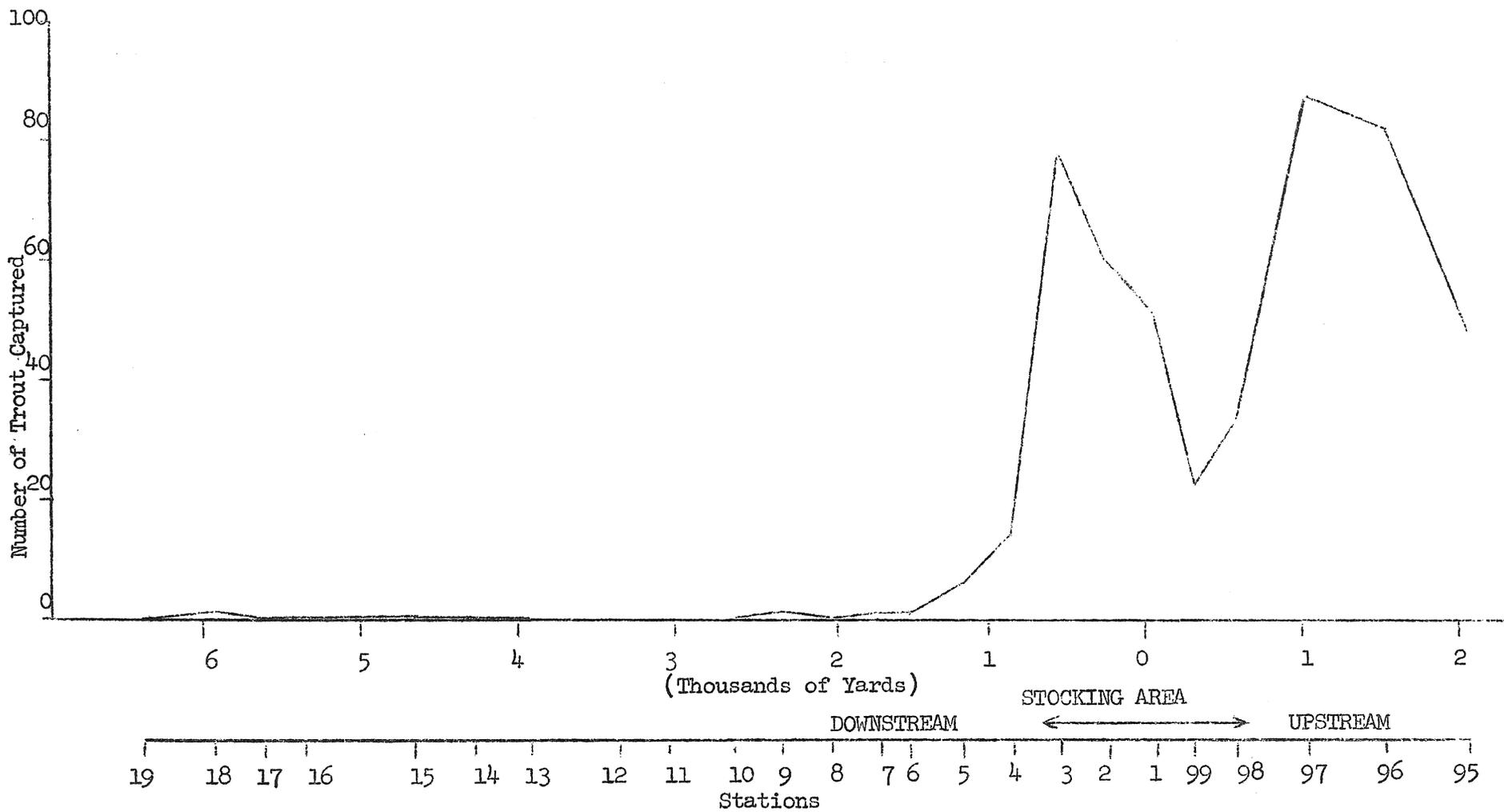


Figure 15: Dispersal of brown trout in Black Earth Creek between time of stocking as fingerlings October 11, 1961 and time of capture April 3 - 5, 1962.

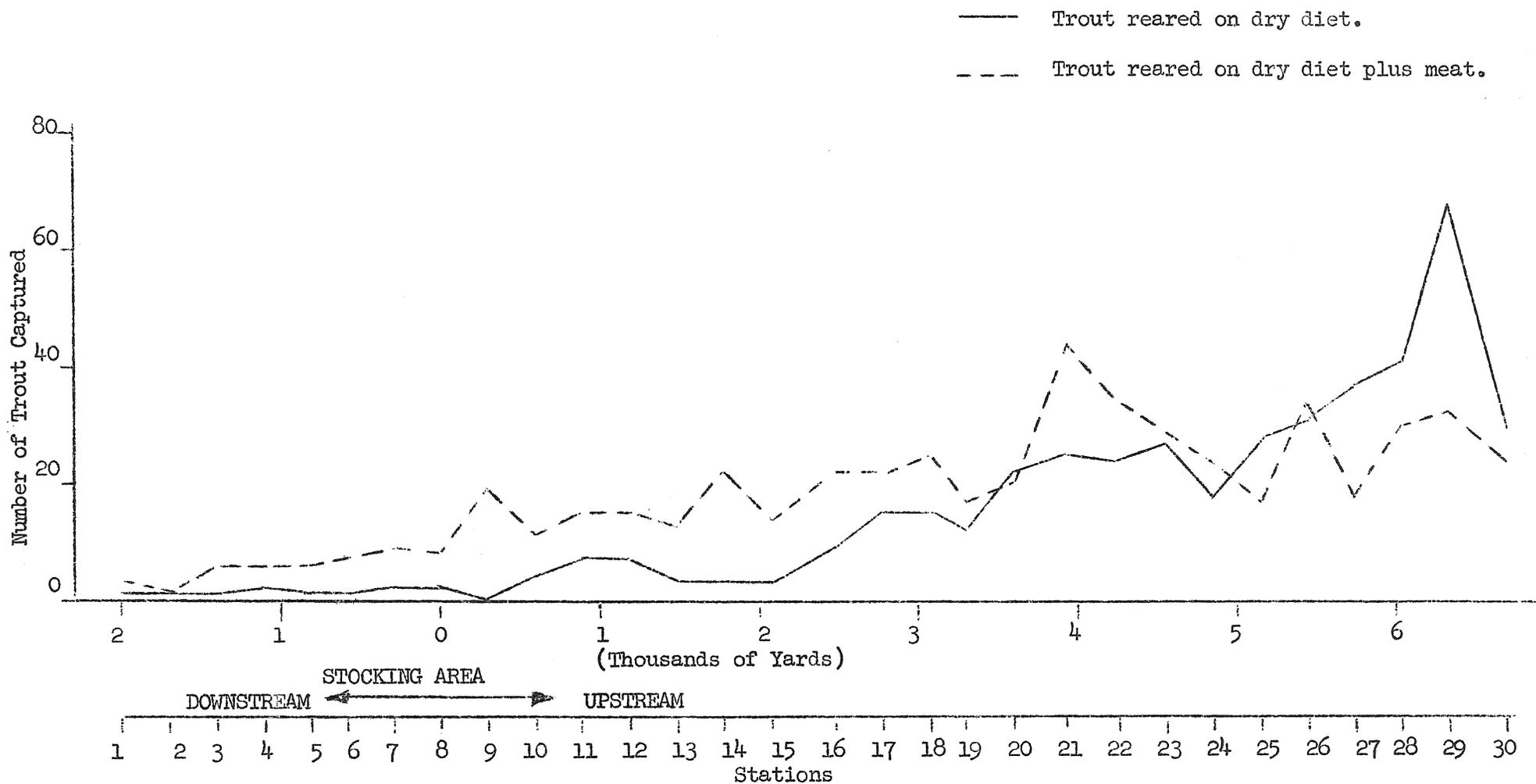


Figure 16: Dispersal of brown trout in Trout Creek between time of stocking as fingerlings September 16, 1961 and time of capture March 26 - 31, 1962. One group of 1,000 trout was reared on a dry diet and the other group of 1,000 was reared on a dry diet plus fresh meat.

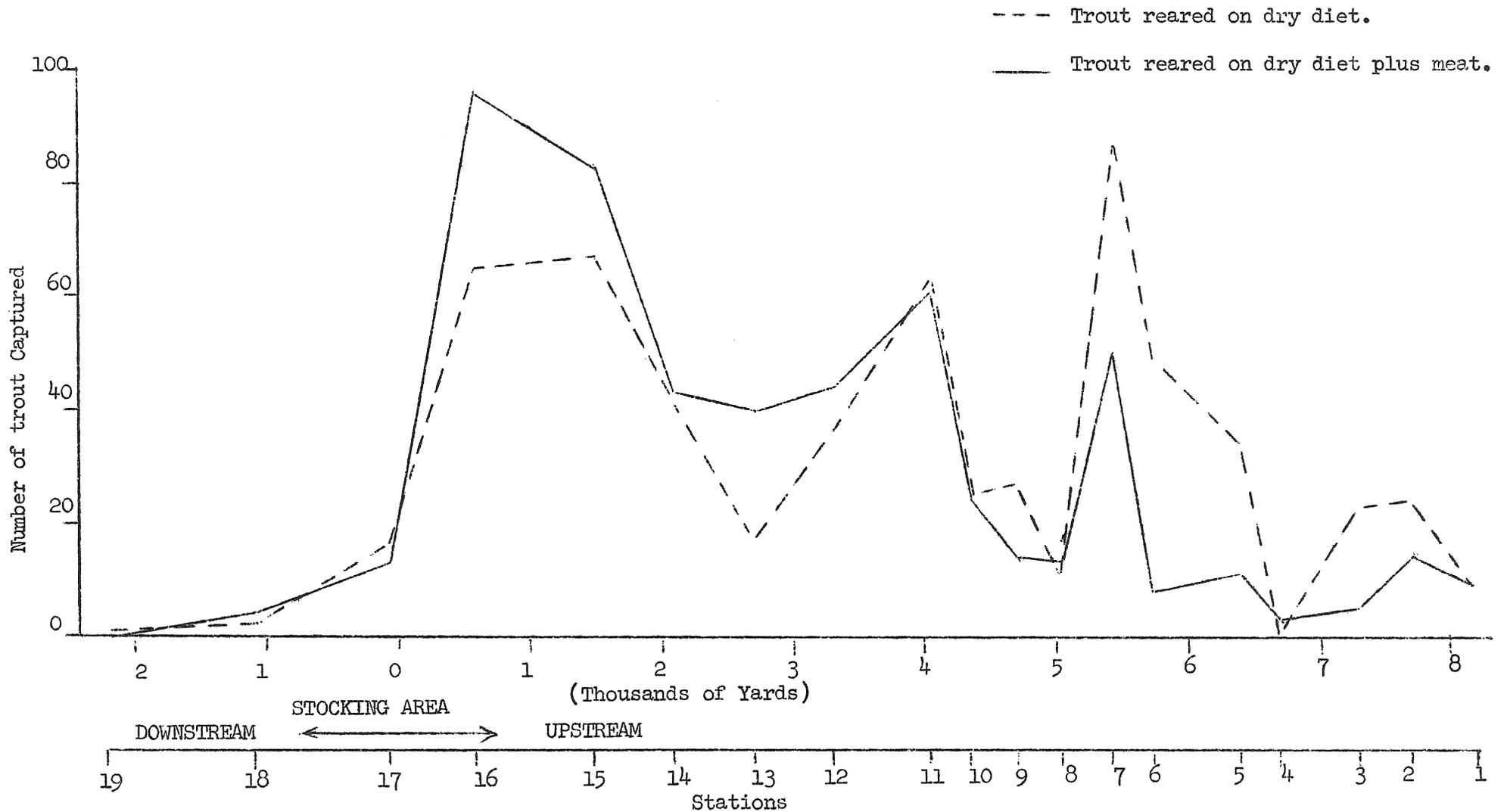


Figure 17: Dispersal of brown trout in Mt. Vernon Creek between time of stocking as fingerlings September 25, 1962 and time of capture April 9 - 12, 1963. One group of 1,000 trout was reared on a dry diet and the other group of 1,000 was reared on a dry diet plus fresh meat.

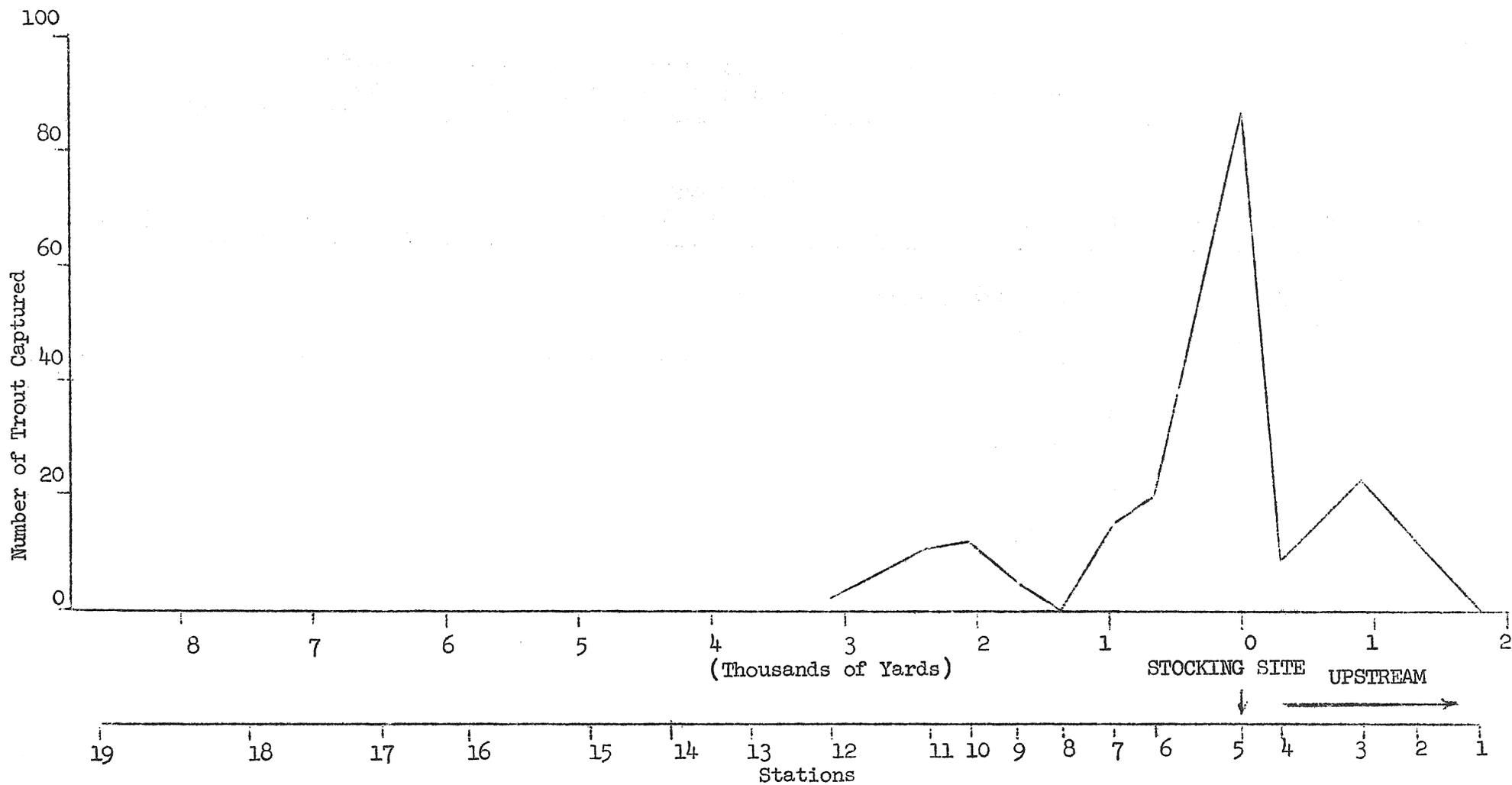


Figure 18: Dispersal of brown trout in Mt. Vernon Creek between time of stocking as yearlings January 27, 1955 and time of capture April 4 - 8, 1955.

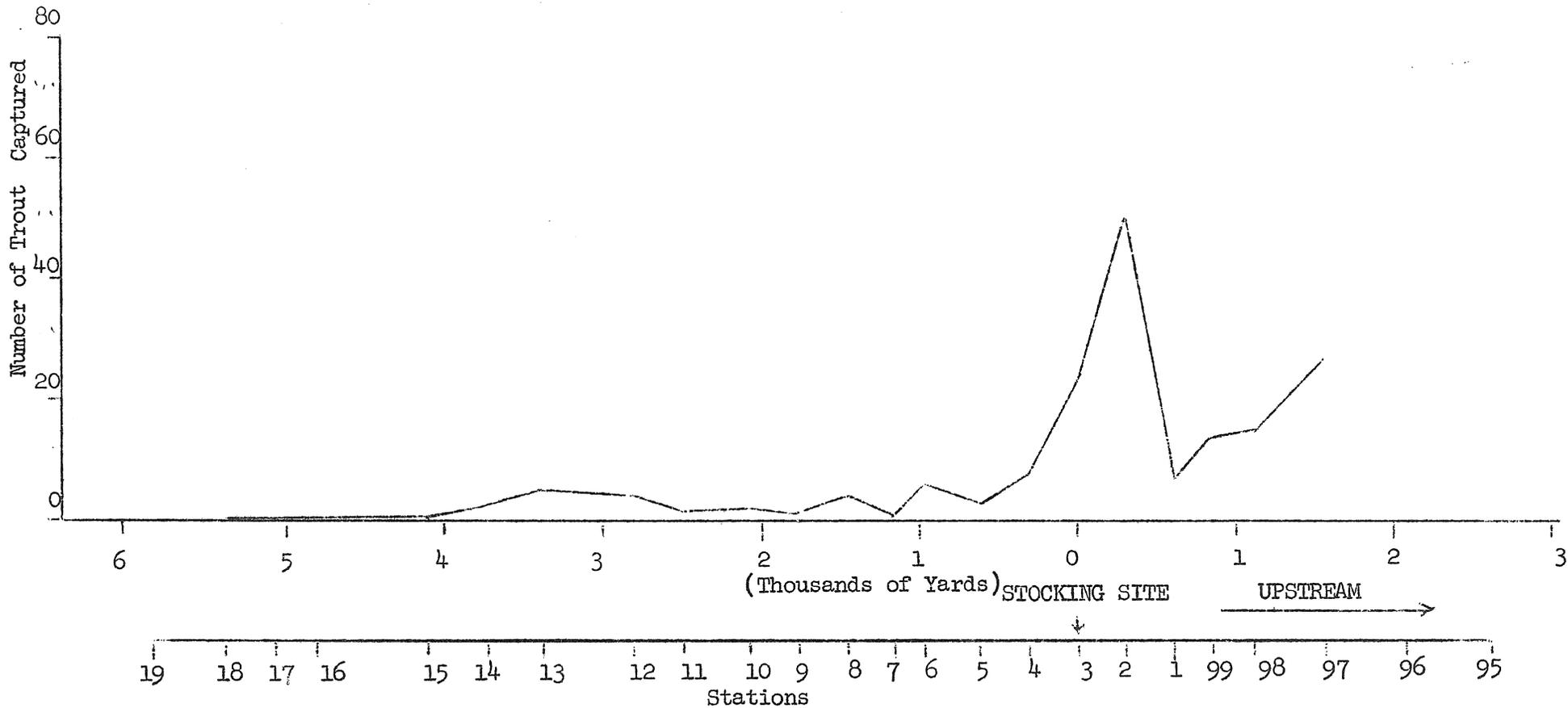
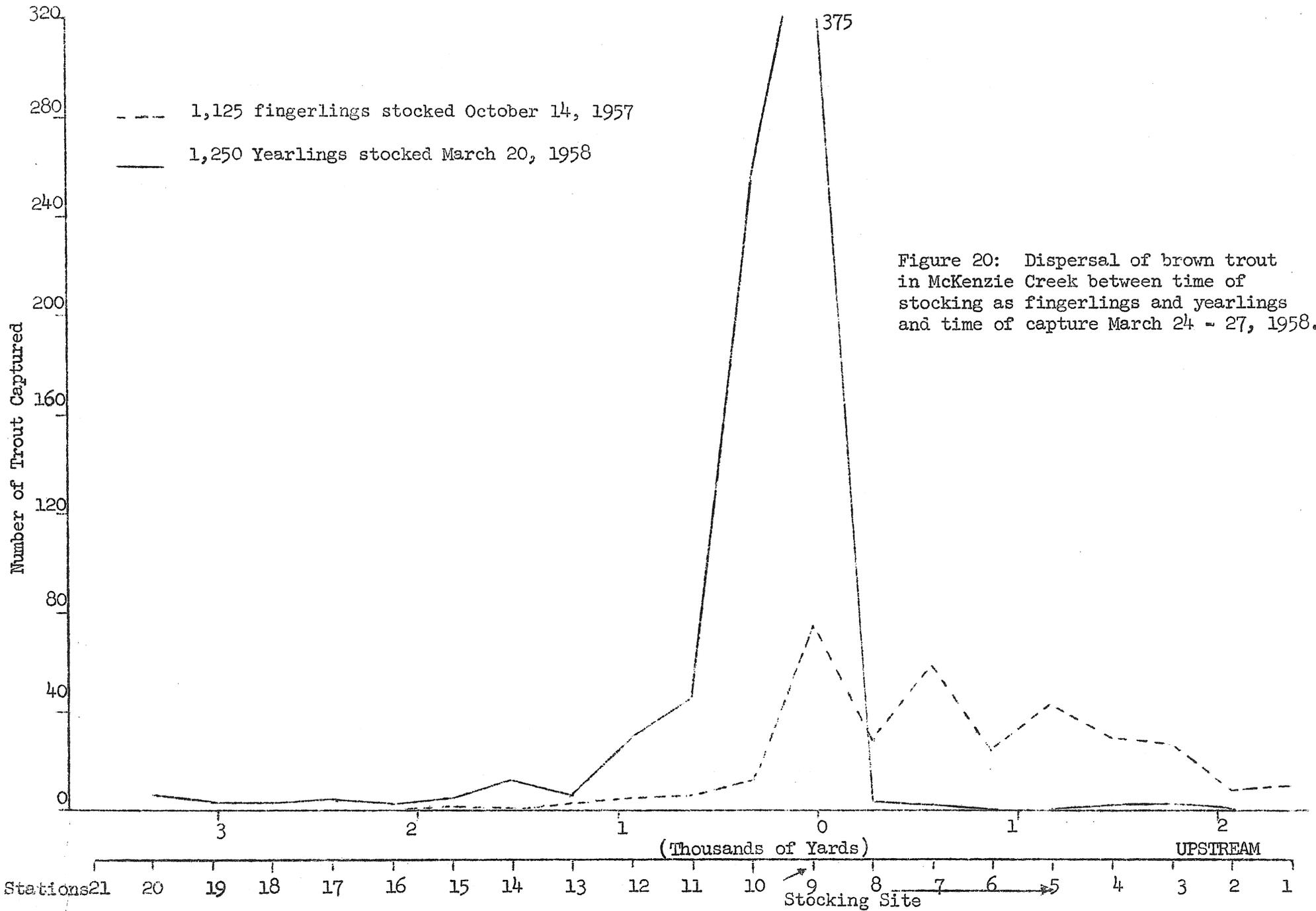
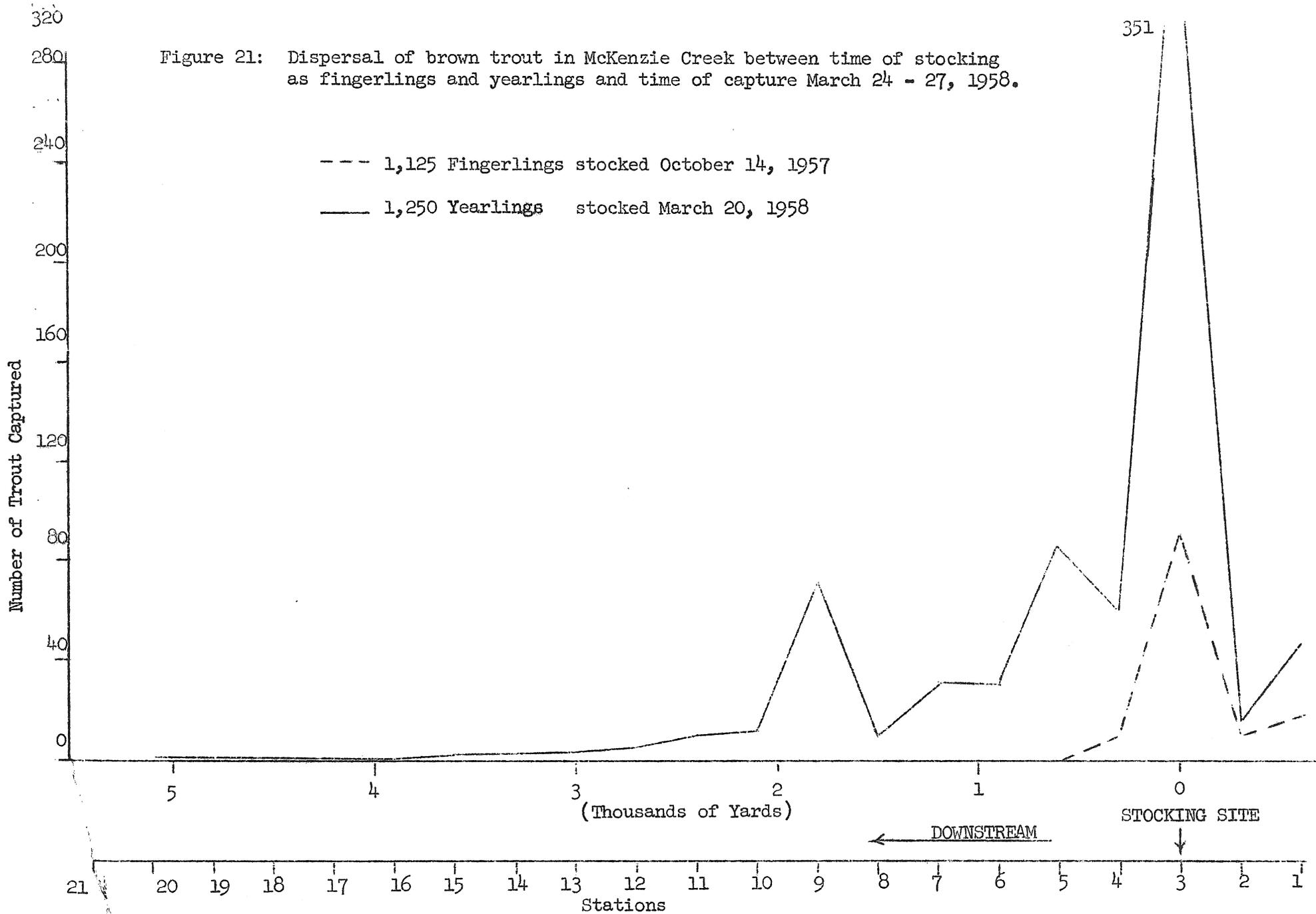


Figure 19: Dispersal of brown trout in Black Earth Creek between time of stocking as yearlings January 25, 1955 and time of capture April 14 - 21, 1955. Dispersal above station 97 was barred by a mill pond.





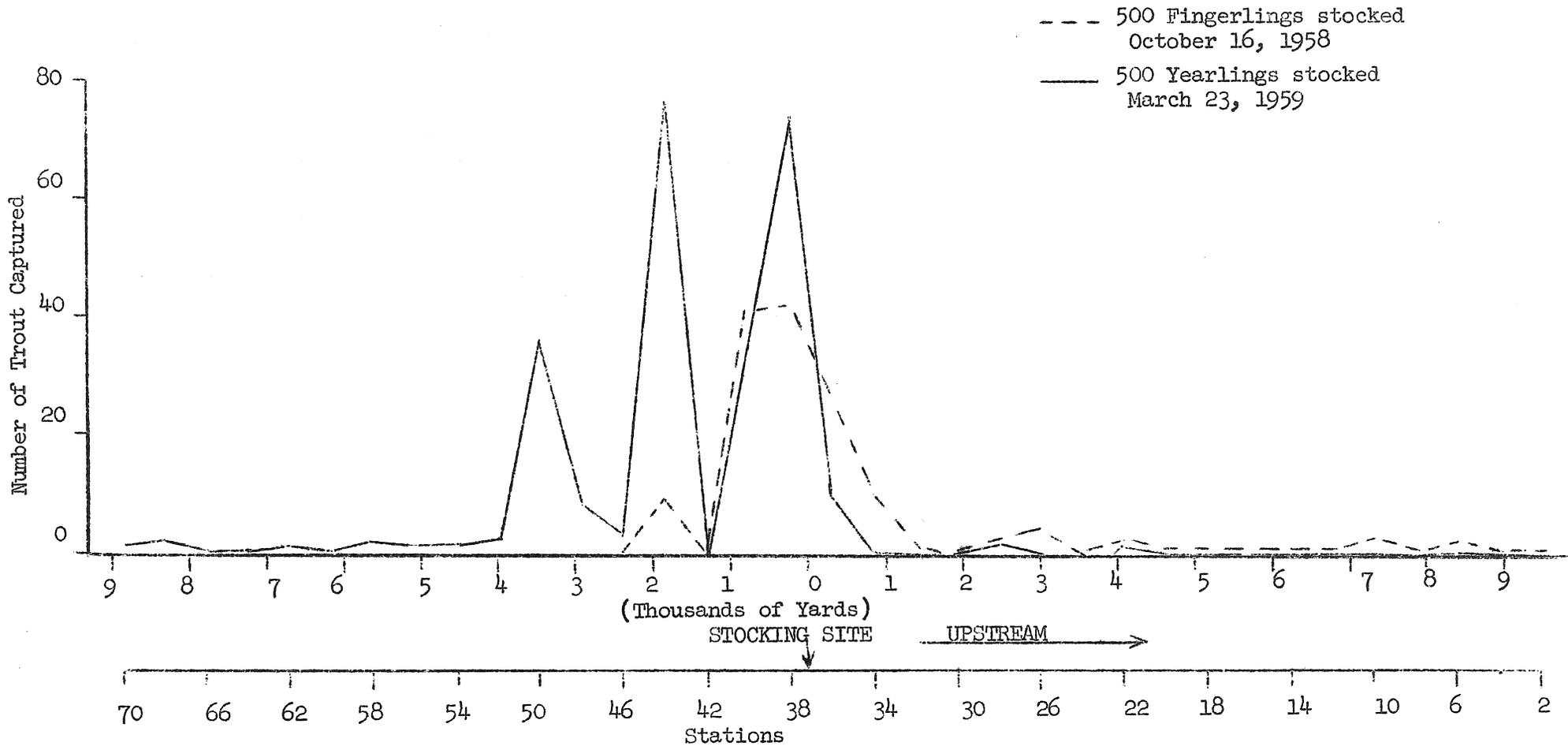


Figure 22: Dispersal of brown trout in Big Roche-a-Cri Creek between time of stocking as fingerlings and yearlings and time of capture March 26 - 31, 1959.

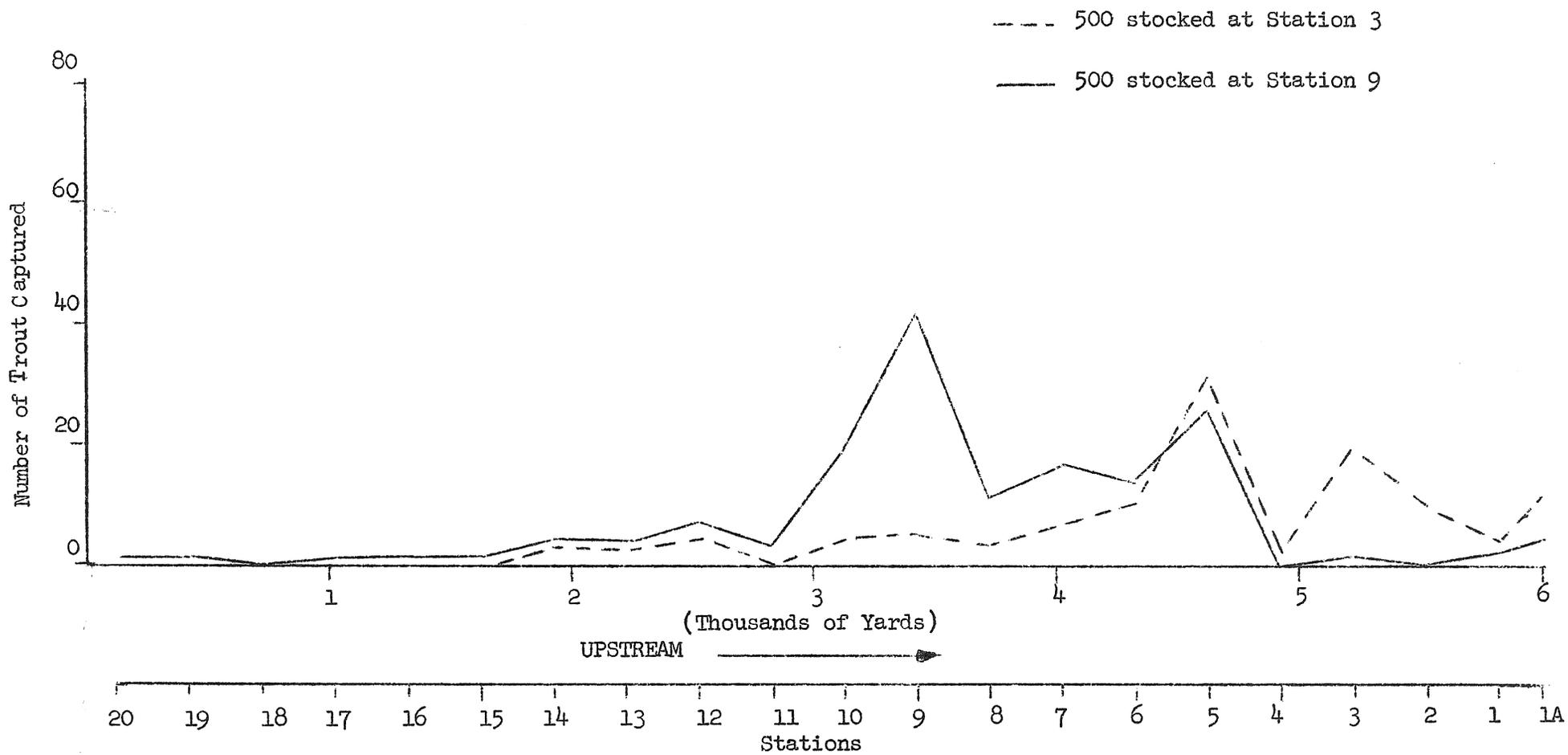
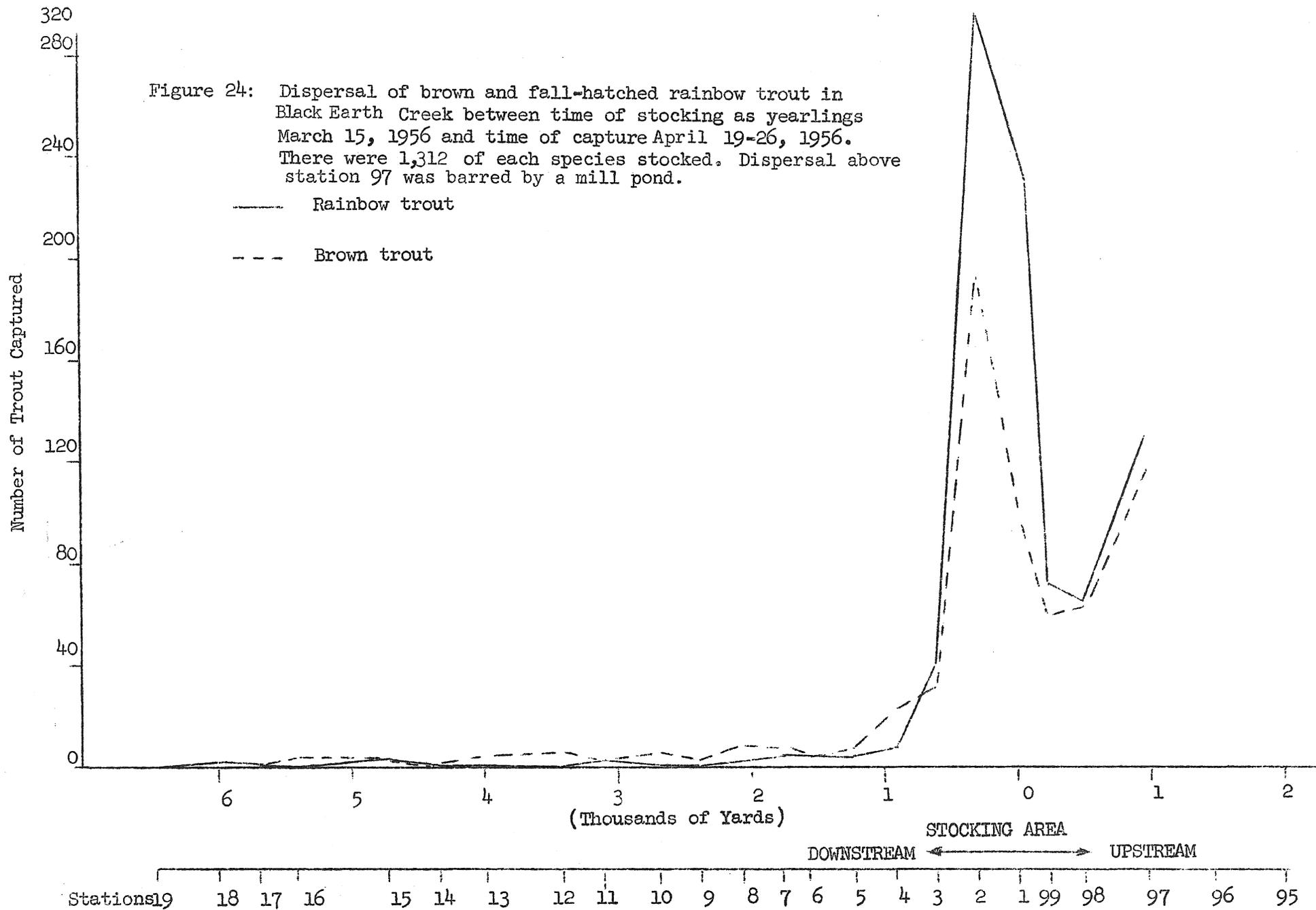
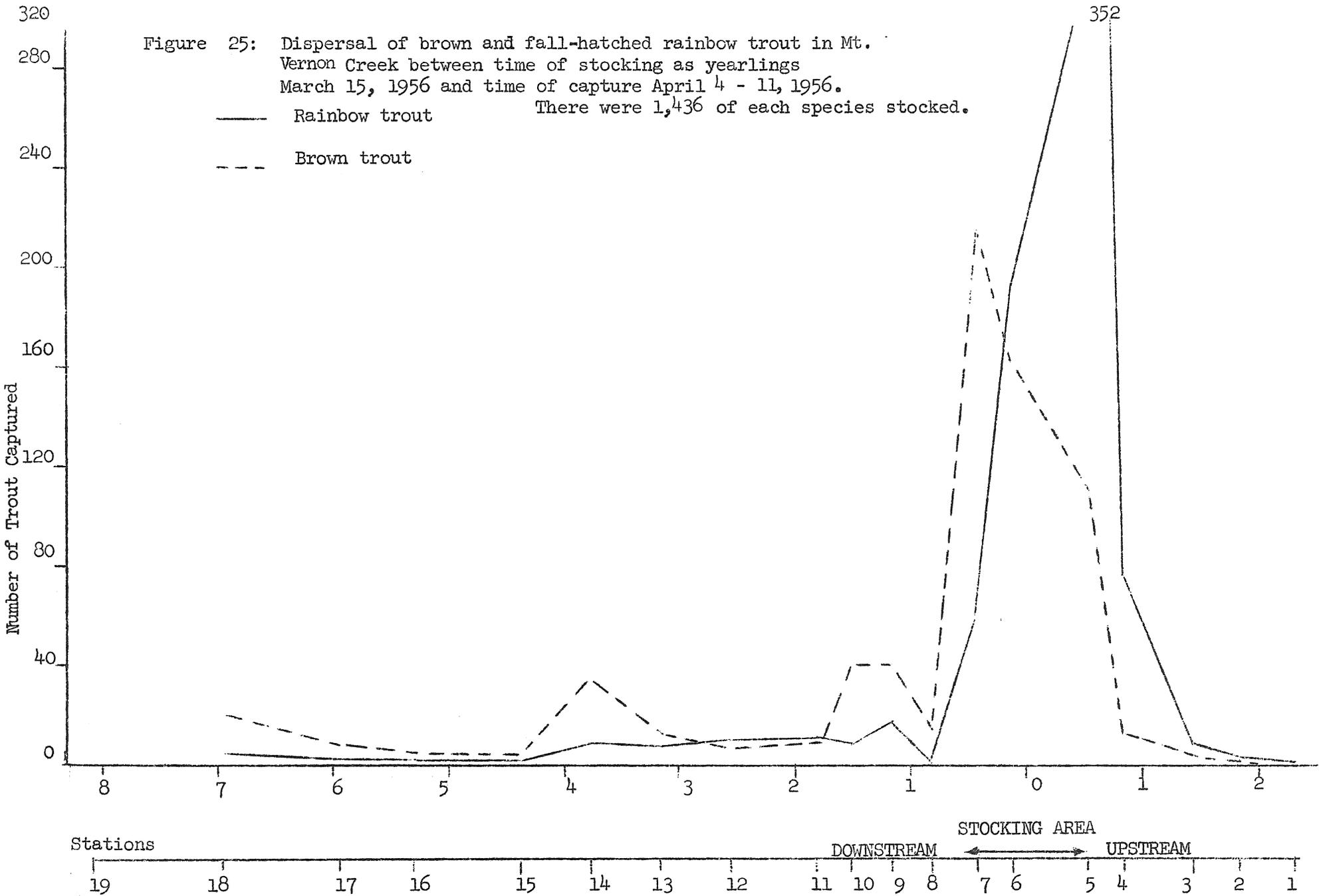


Figure 23: Dispersal of brown trout in McKenzie Creek between time of stocking as yearlings March 20, 1957 and time of capture March 26 - 28, 1957.





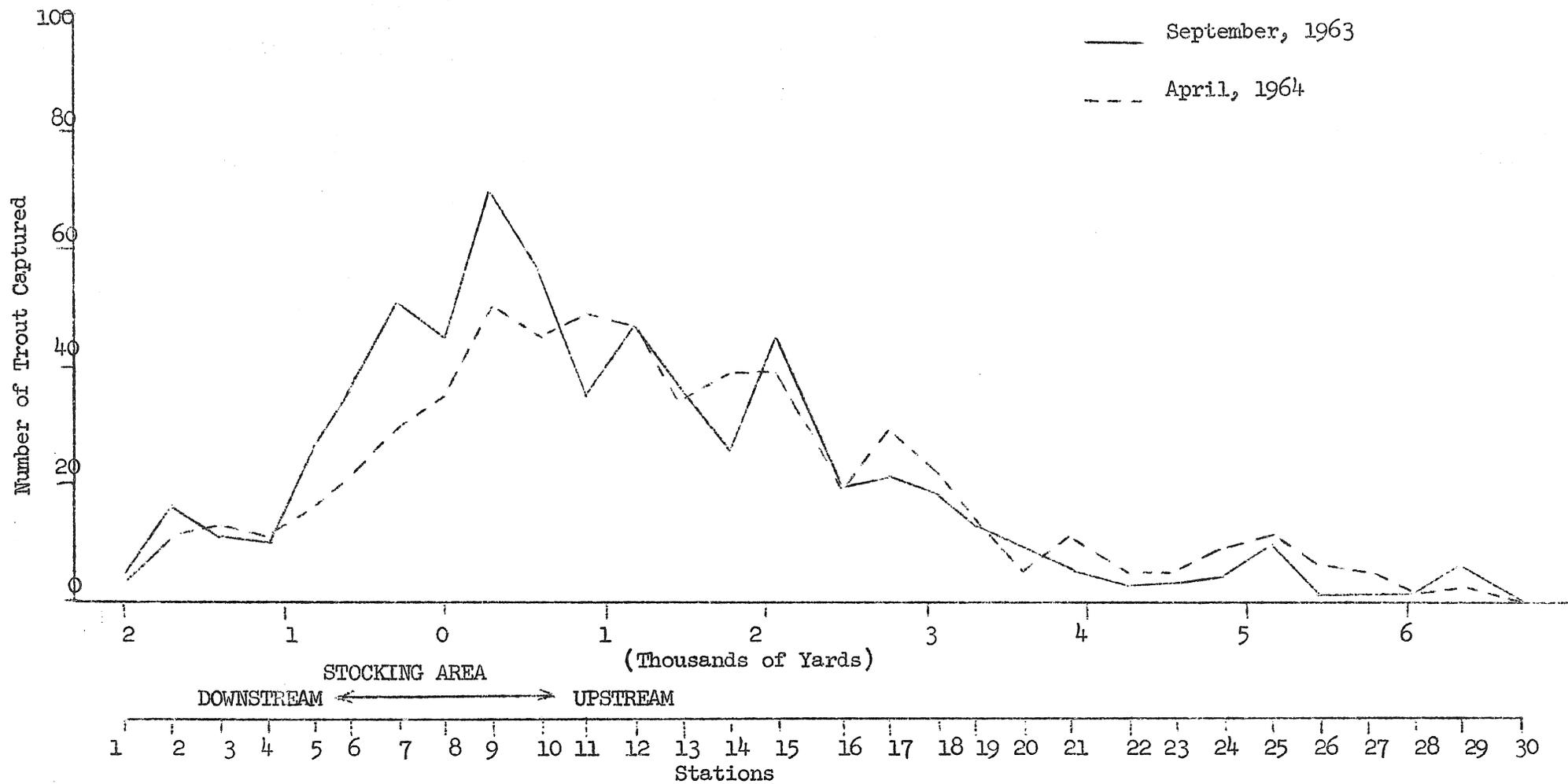


Figure 26: Dispersal of brown trout in Trout Creek between time of stocking as fingerlings May 20, 1963 and time of capture September 20-23, 1963 and April 11-14, 1964.

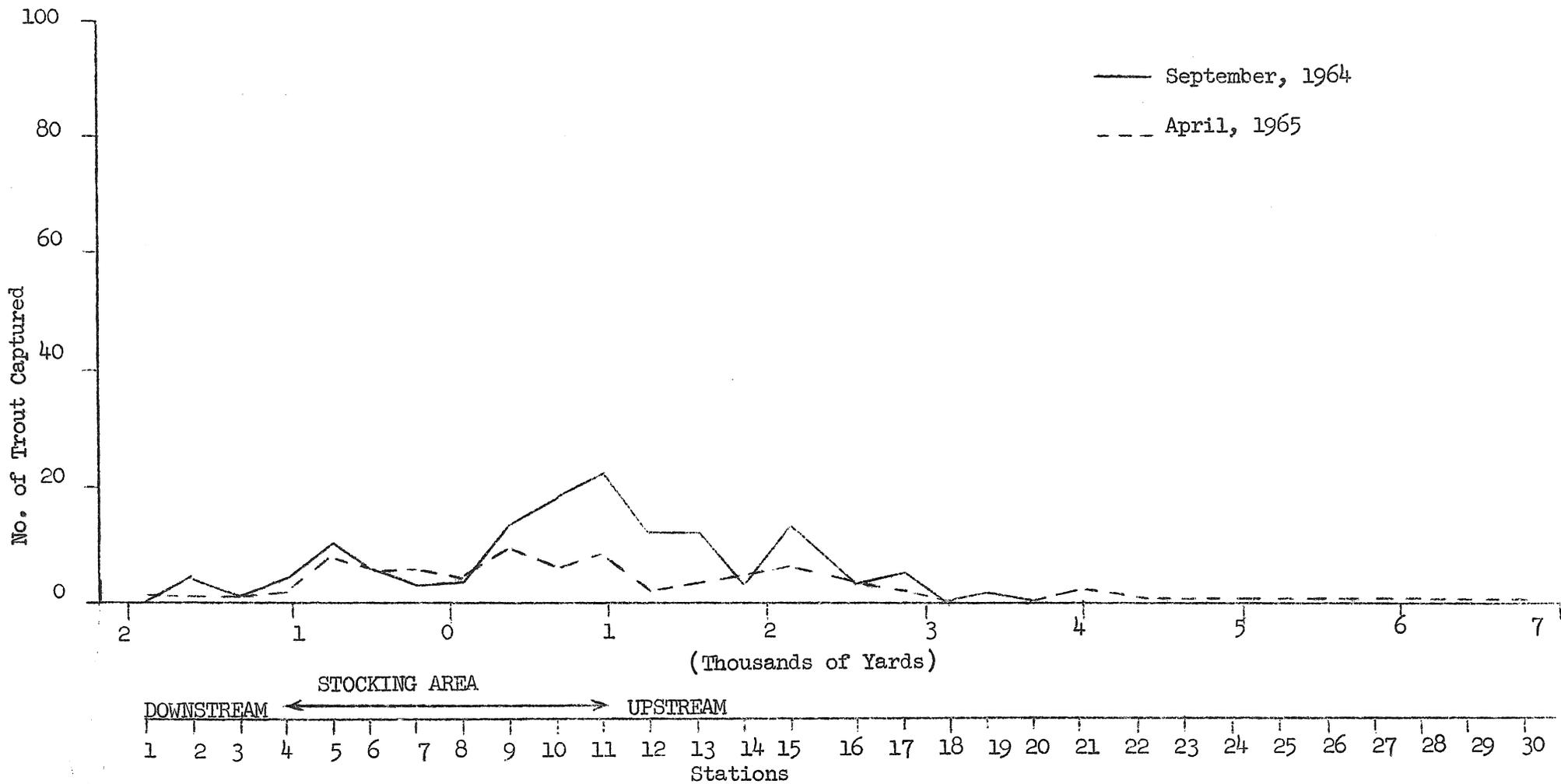


Figure 27: Dispersal of brown trout in Trout Creek between time of stocking as fingerlings May 26, 1964 and time of capture September 15-17, 1964 and April 12-16, 1965.

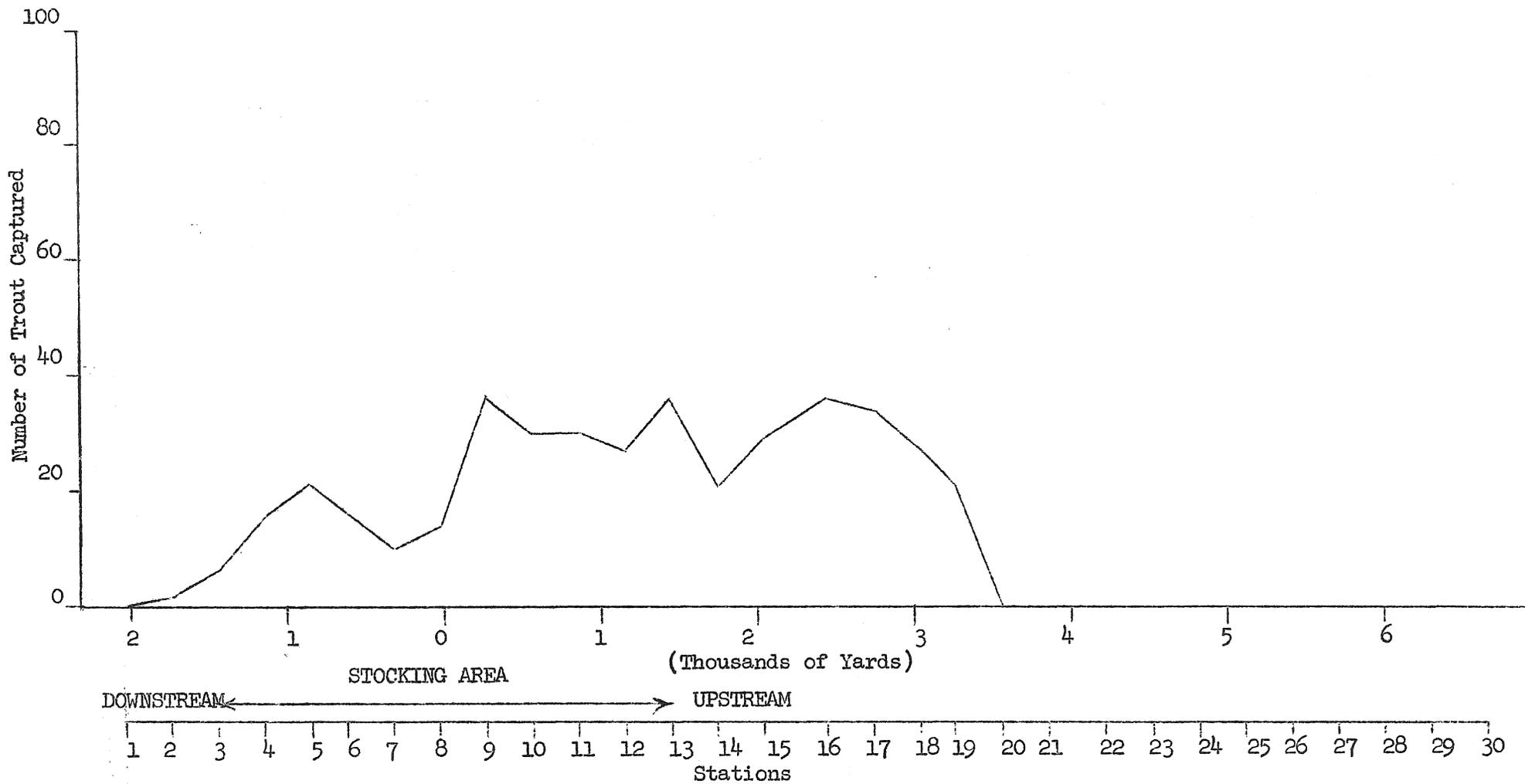


Figure 28: Dispersal of brown trout in Trout Creek between time of stocking as fingerlings June 8, 1966 and time of capture September 16-19, 1966.

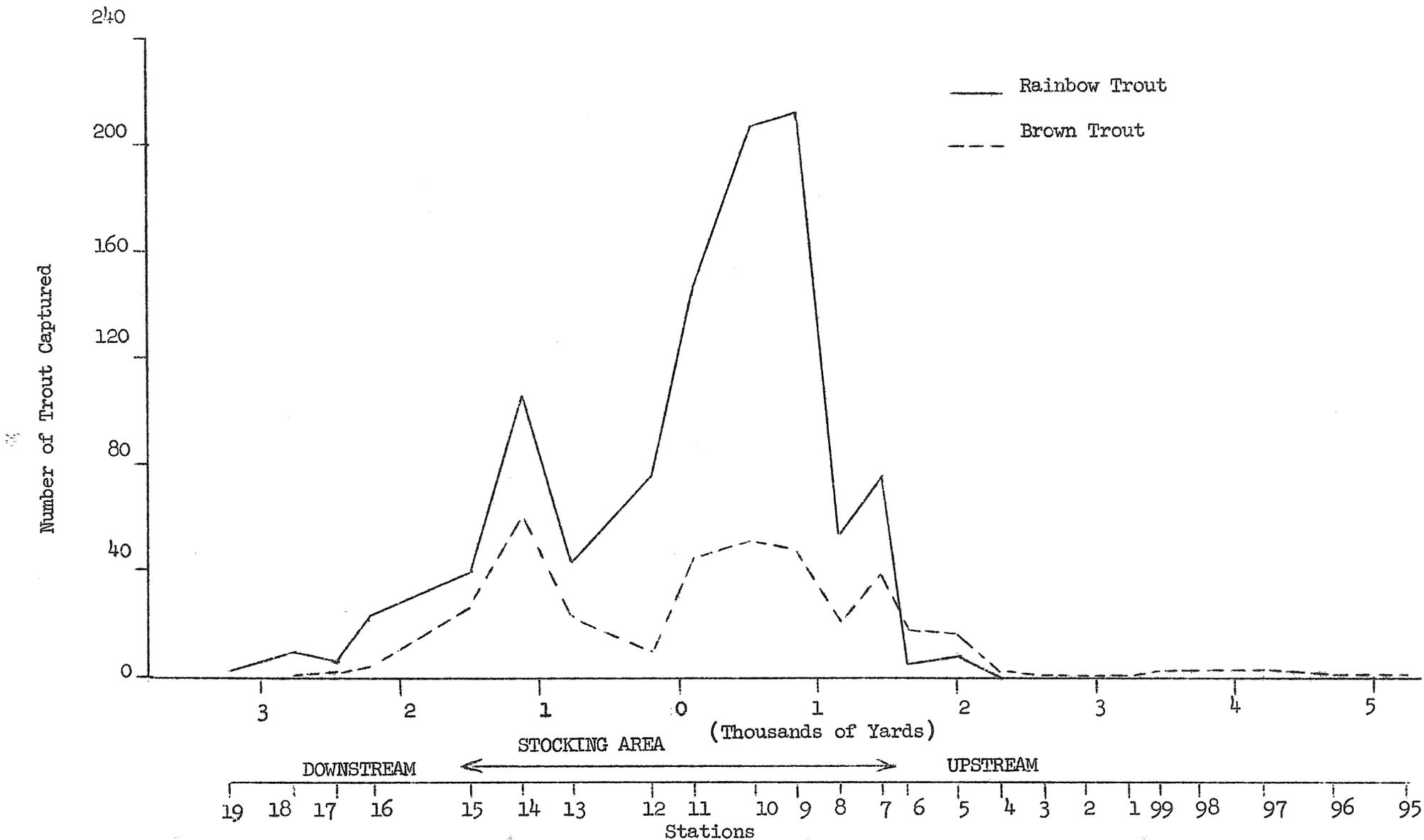
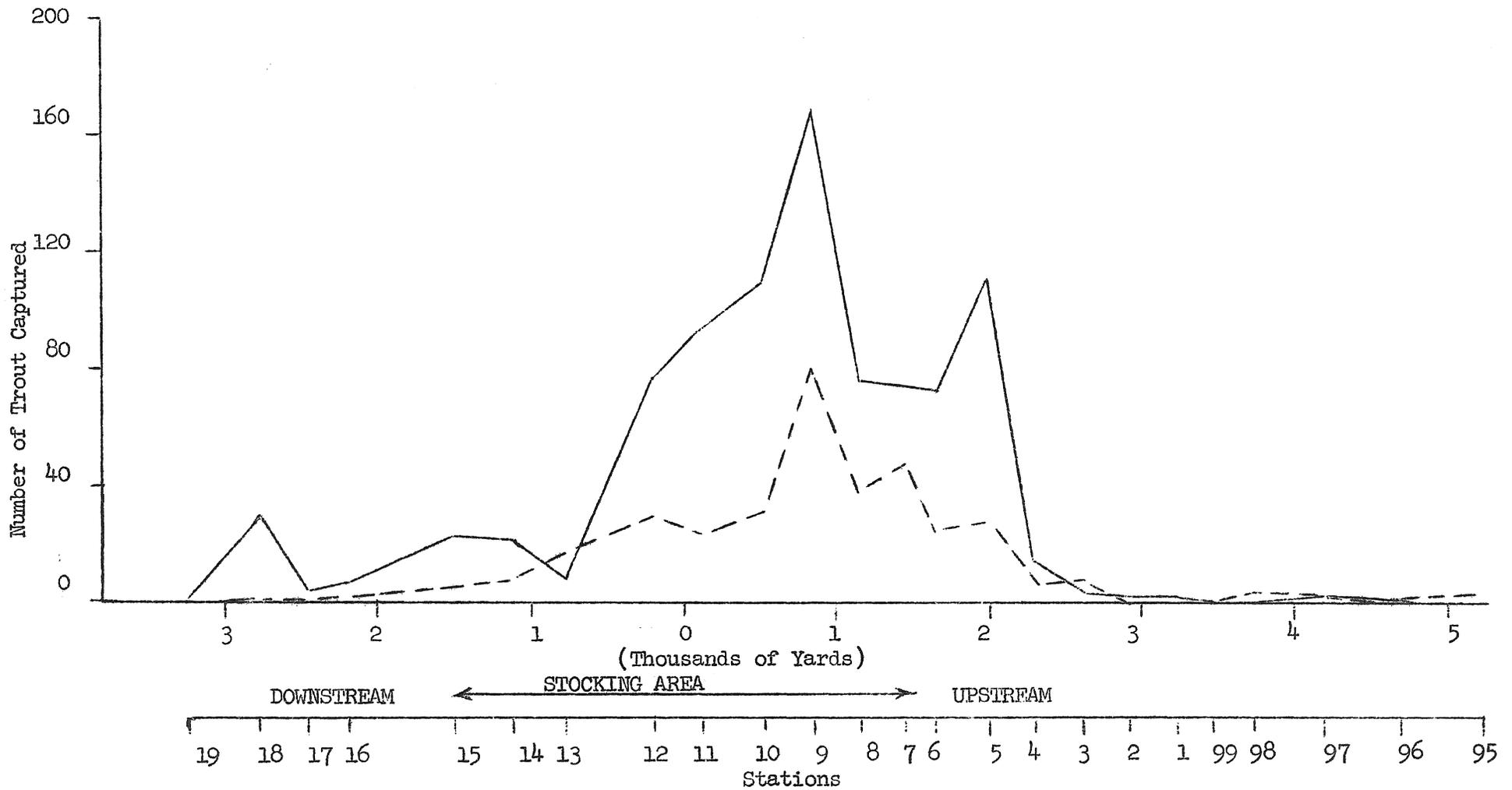


Figure 29: Dispersal of brown and fall-hatched rainbow trout in Black Earth Creek between time of stocking as fingerlings June 14, 1962 and time of capture September 8-12, 1962. Equal numbers of each species were stocked.

Figure 30: Dispersal of brown and fall-hatched rainbow trout in Black Earth Creek between time of capture September 8-12, 1962 and time of recapture April 1-4, 1963. These are the same stocks of trout as shown in Figure 29.



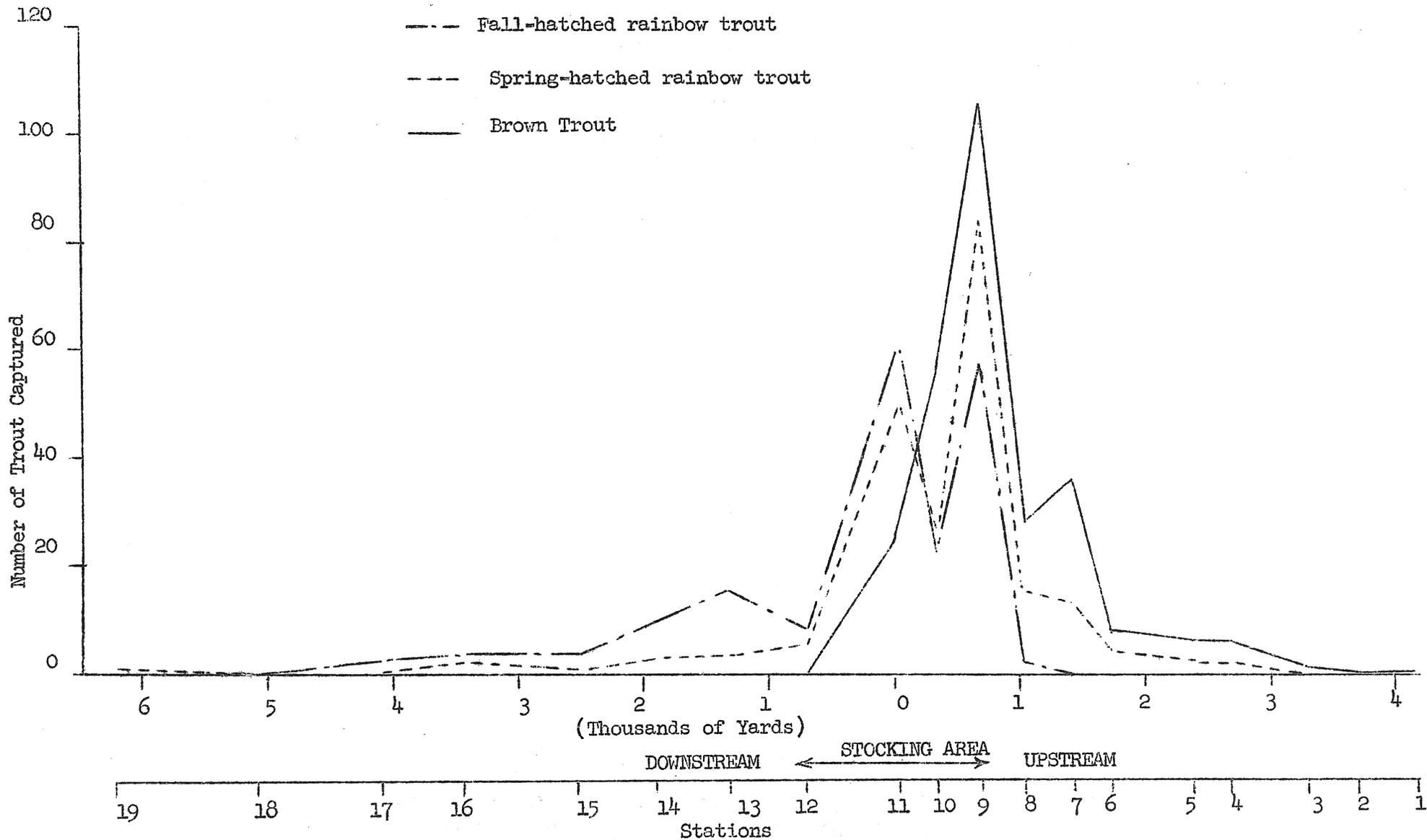
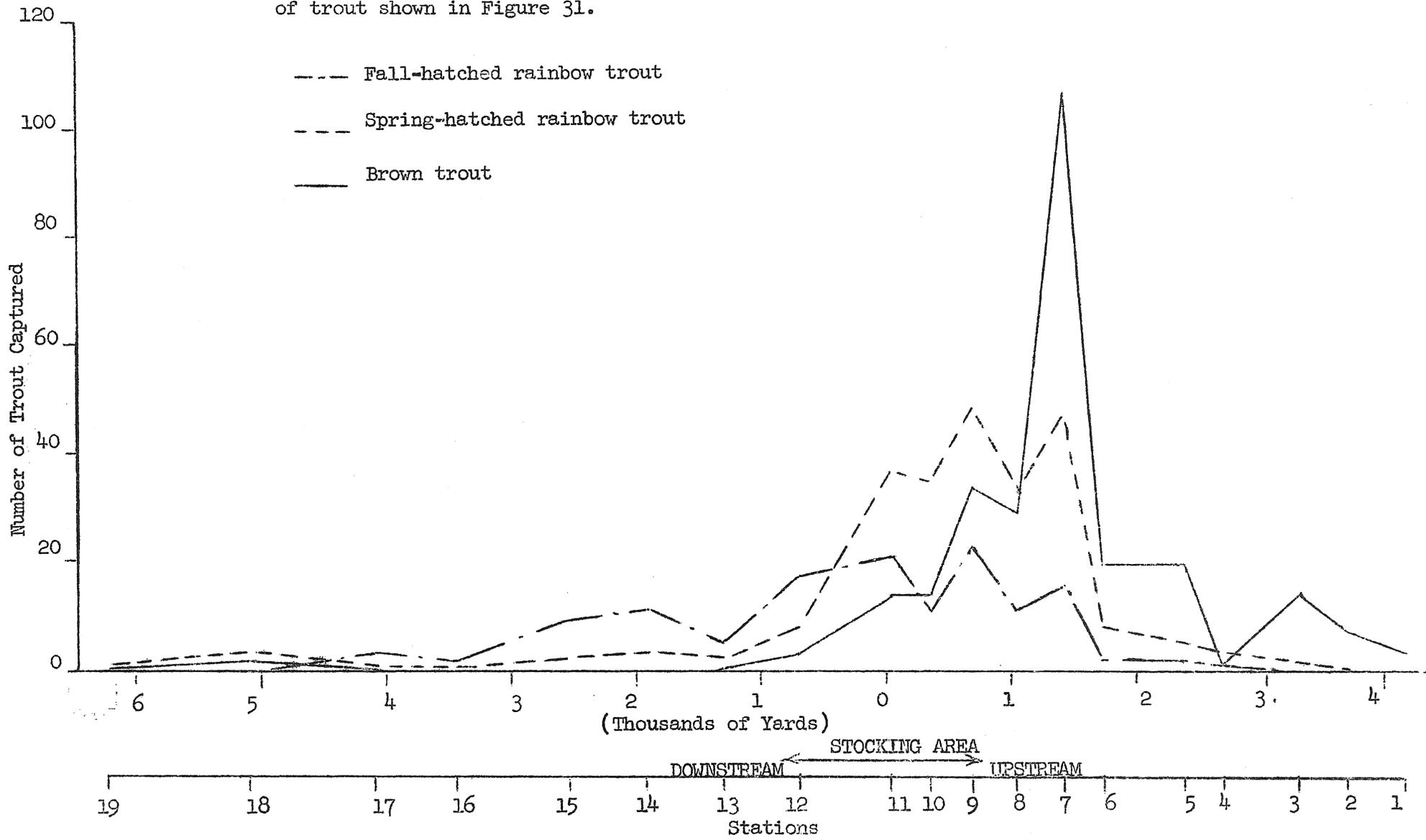


Figure 31: Dispersal of brown and fall and spring-hatched rainbow trout in Mt. Vernon Creek between time of stocking as fingerlings June 15, 1962 and time of capture September 15-19, 1962.

Figure 32: Dispersal of brown and fall and spring-hatched rainbow trout in Mt. Vernon Creek between time of capture September 15-19, 1962 and time of recapture April 9-11, 1963. These are the same stocks of trout shown in Figure 31.



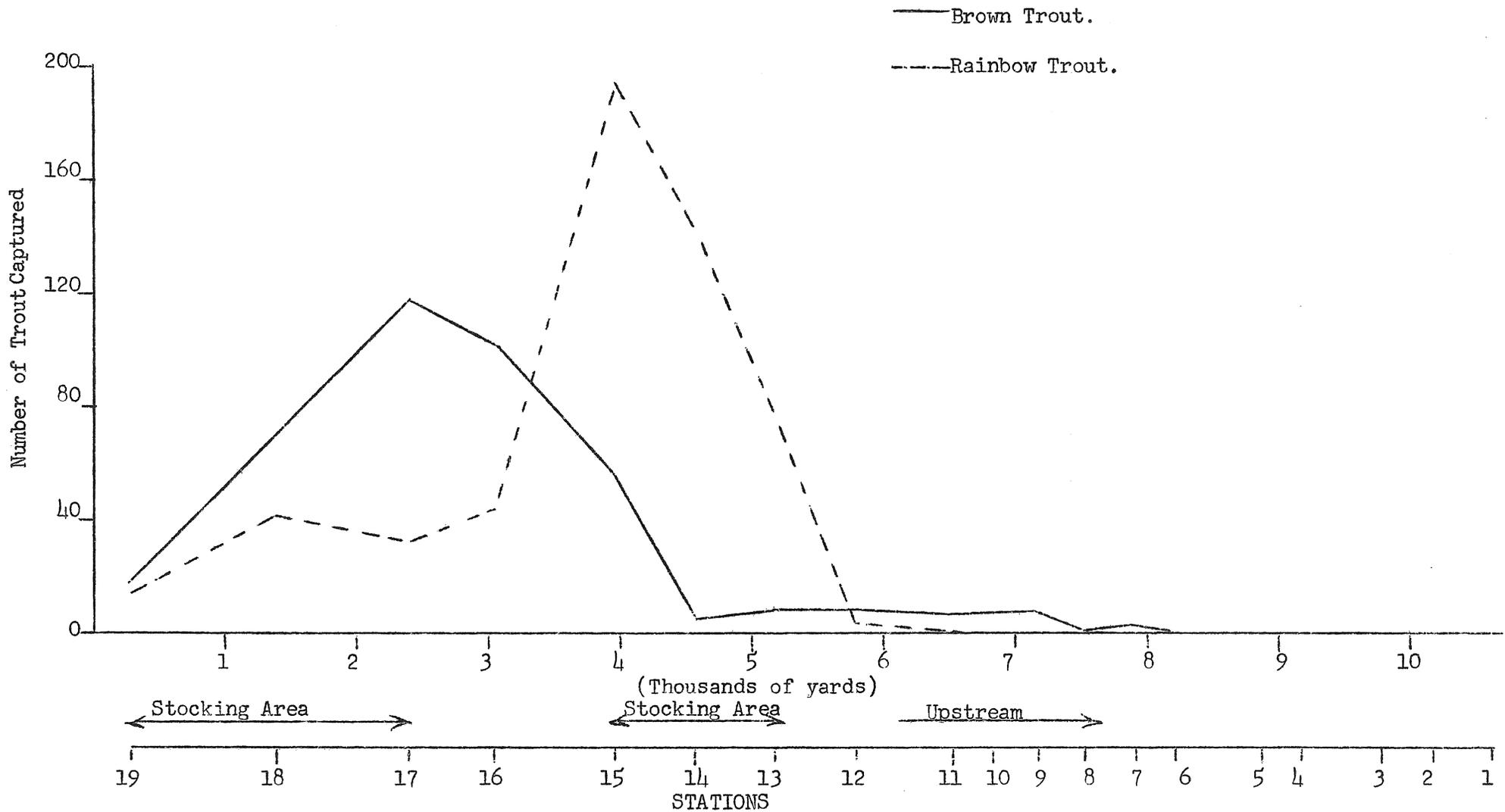
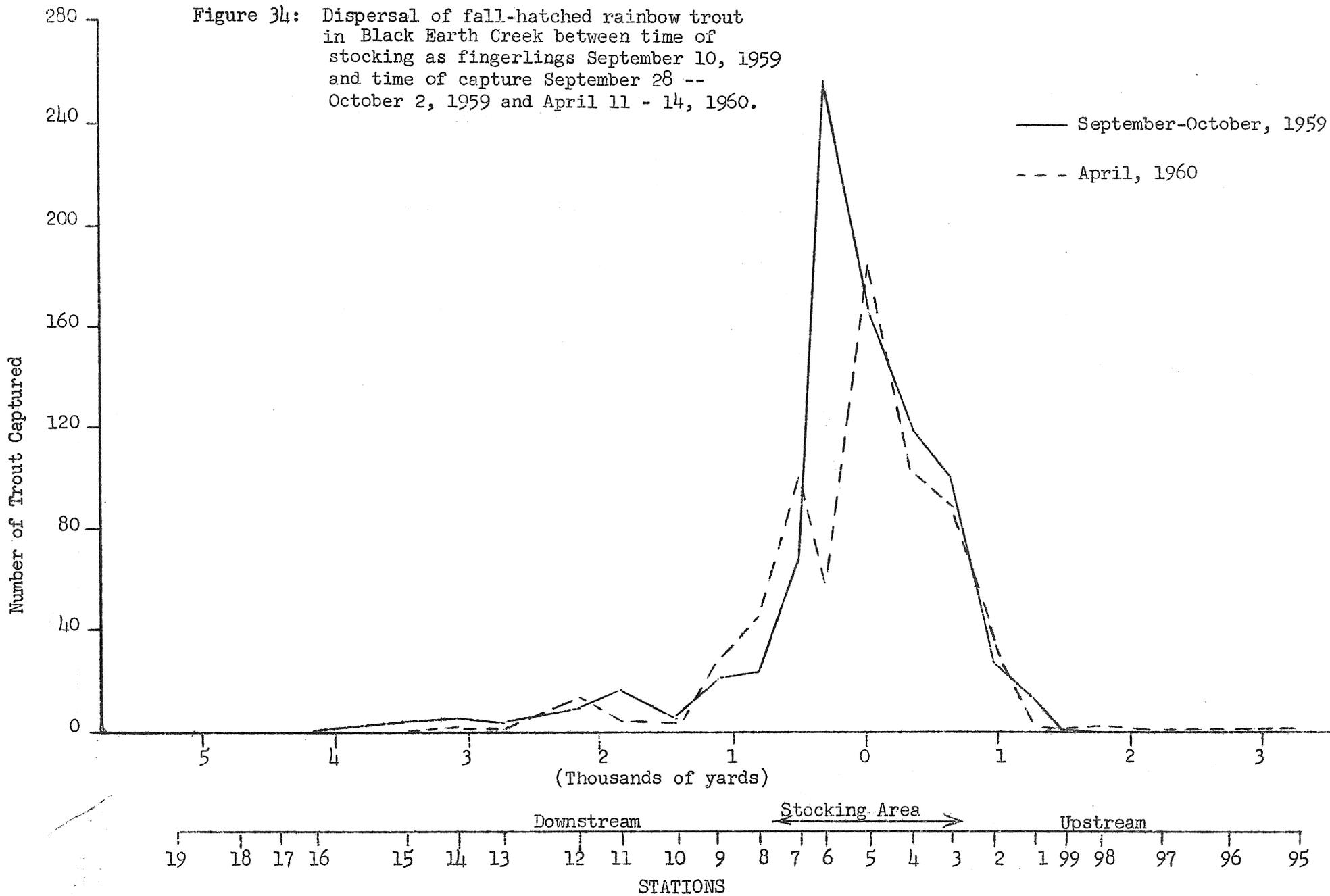


Figure 33: Dispersal of brown and rainbow trout in Mt. Vernon Creek between time of stocking as fingerlings May 20, 1963 and time of capture September 3-6, 1963. The brown and rainbow trout fingerlings were stocked between stations 19-17 and 15-13, respectively.

Figure 34: Dispersal of fall-hatched rainbow trout in Black Earth Creek between time of stocking as fingerlings September 10, 1959 and time of capture September 28 -- October 2, 1959 and April 11 - 14, 1960.



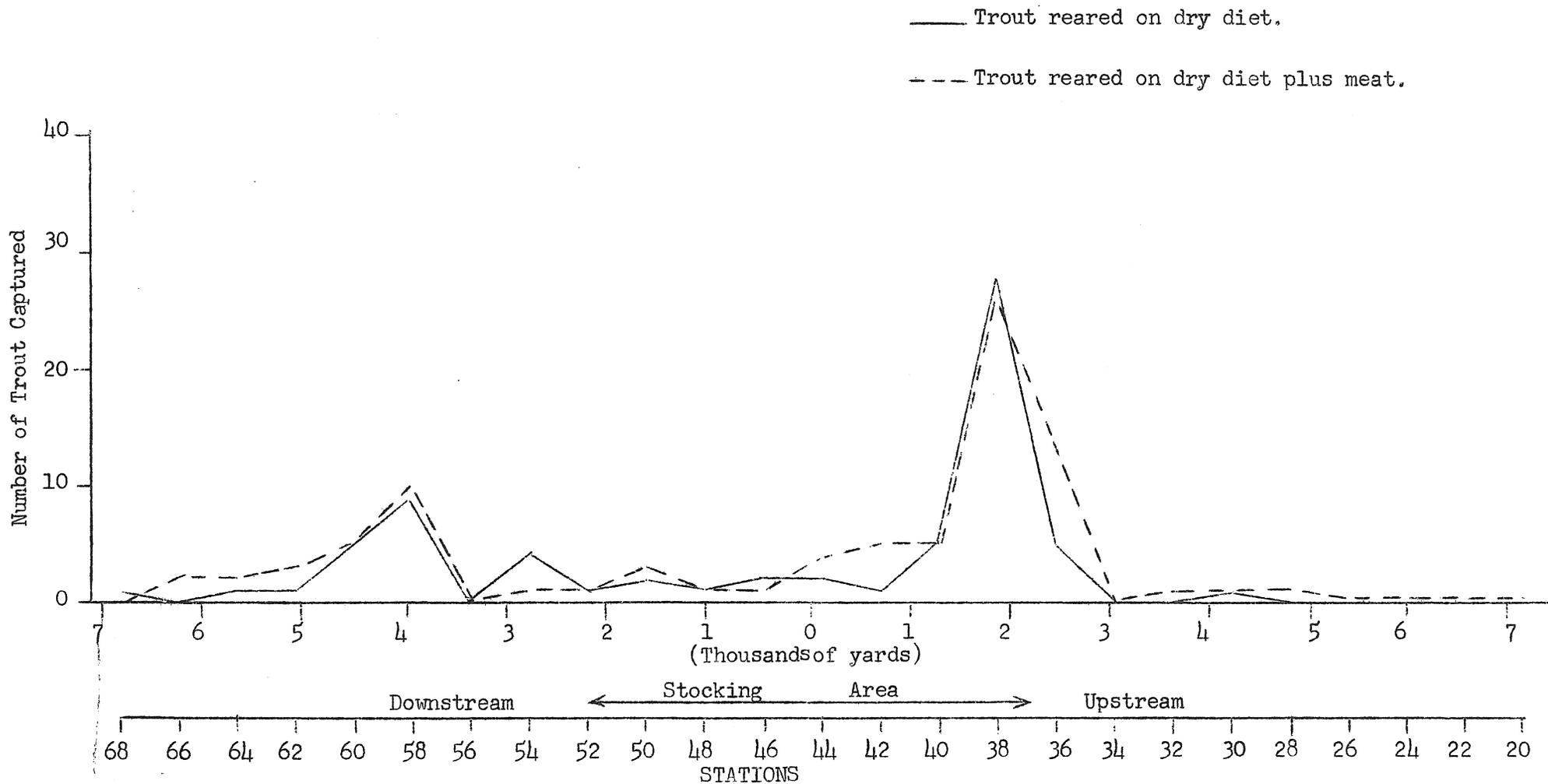


Figure 35: Dispersal of fall-hatched rainbow trout in Big Roche-a-Cri Creek between time of stocking as fingerlings October 4, 1961 and time of capture March 26 - 28, 1962. One group of 1,000 trout was reared on a dry diet and the other group of 1,000 was reared on a dry diet plus fresh meat.

Figure 36: Dispersal of spring-hatched rainbow trout in Mt. Vernon Creek between time of stocking as yearlings September 8, 1962 and time of capture September 18-19, 1962 and April 11-12, 1963.

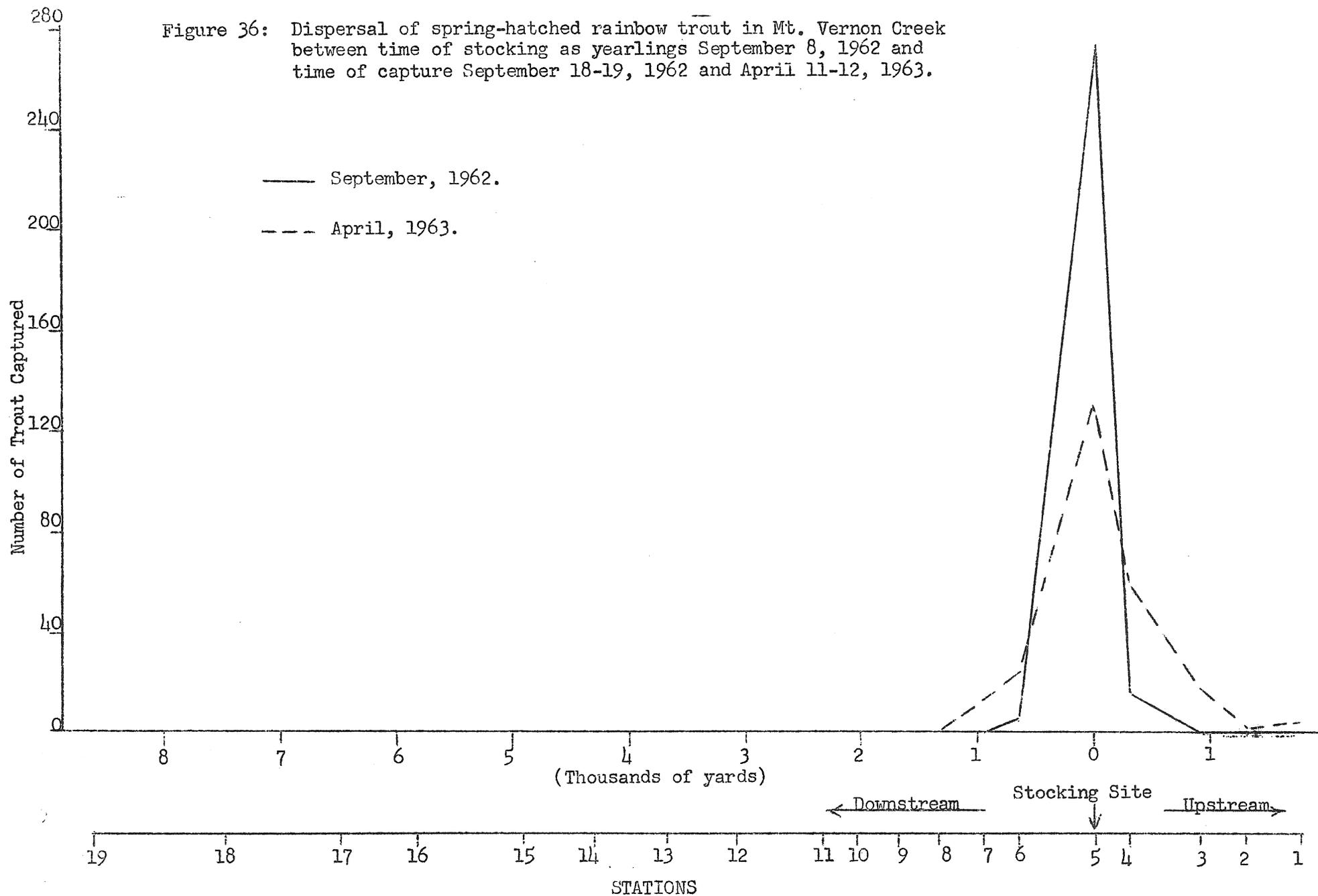
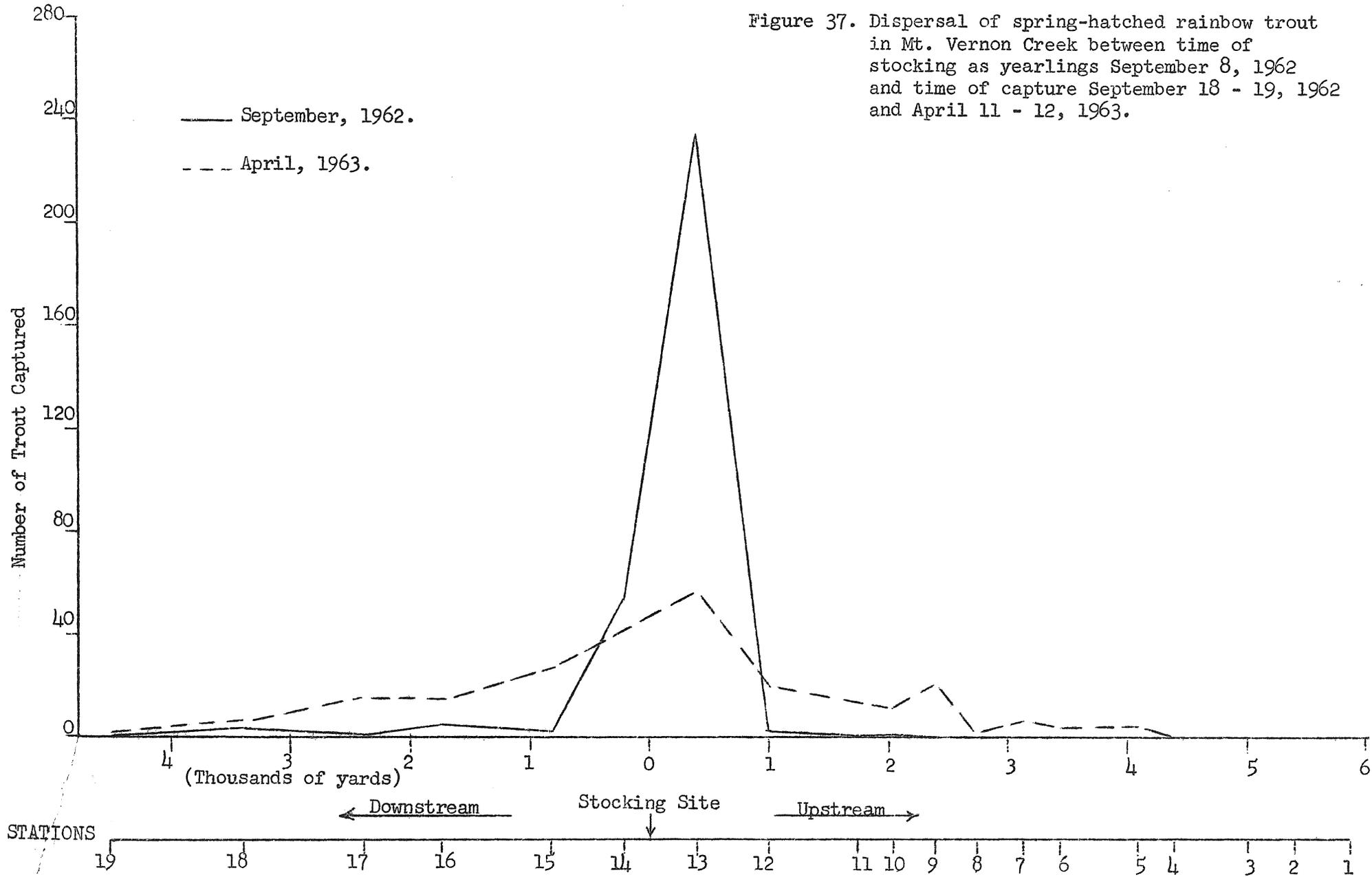


Figure 37. Dispersal of spring-hatched rainbow trout in Mt. Vernon Creek between time of stocking as yearlings September 8, 1962 and time of capture September 18 - 19, 1962 and April 11 - 12, 1963.



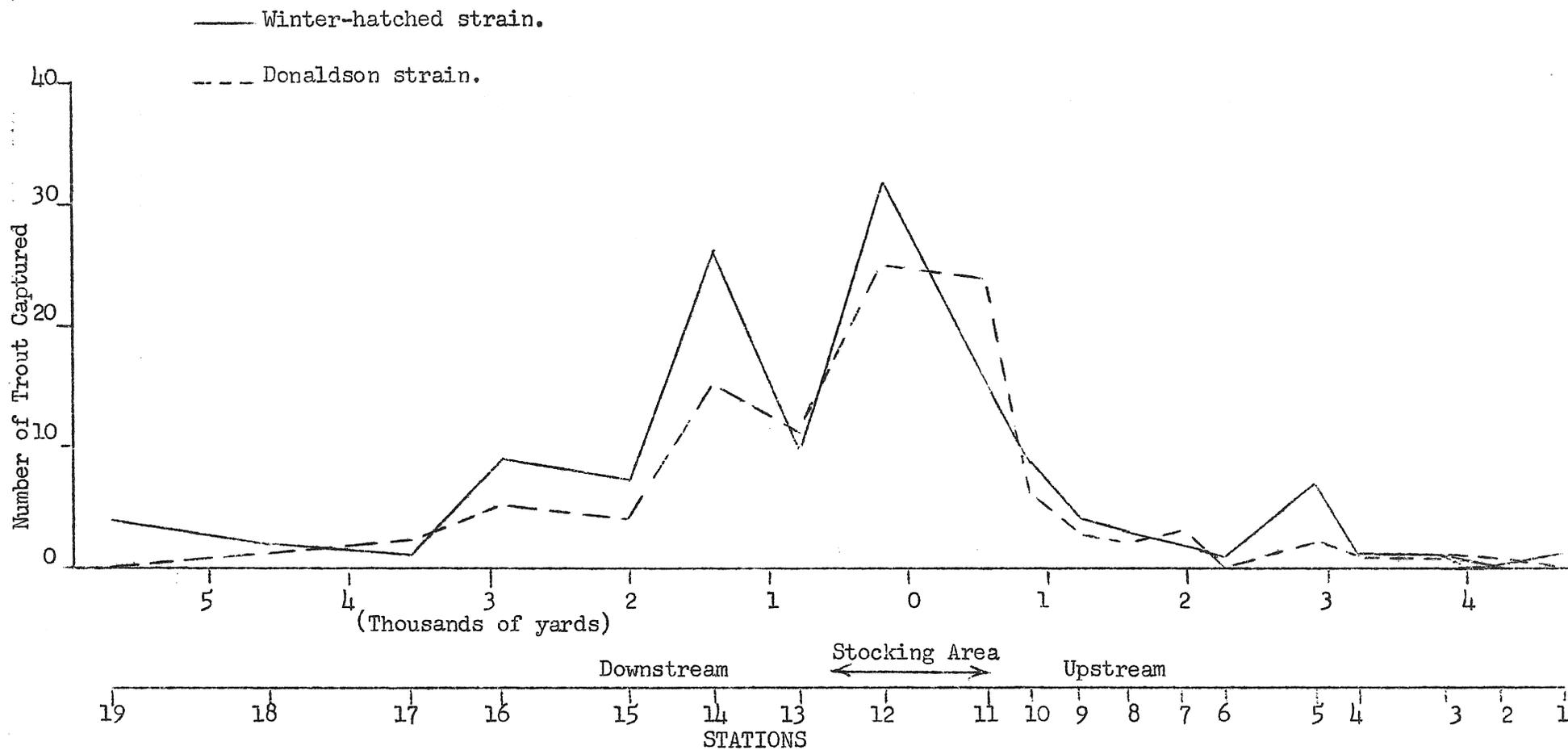
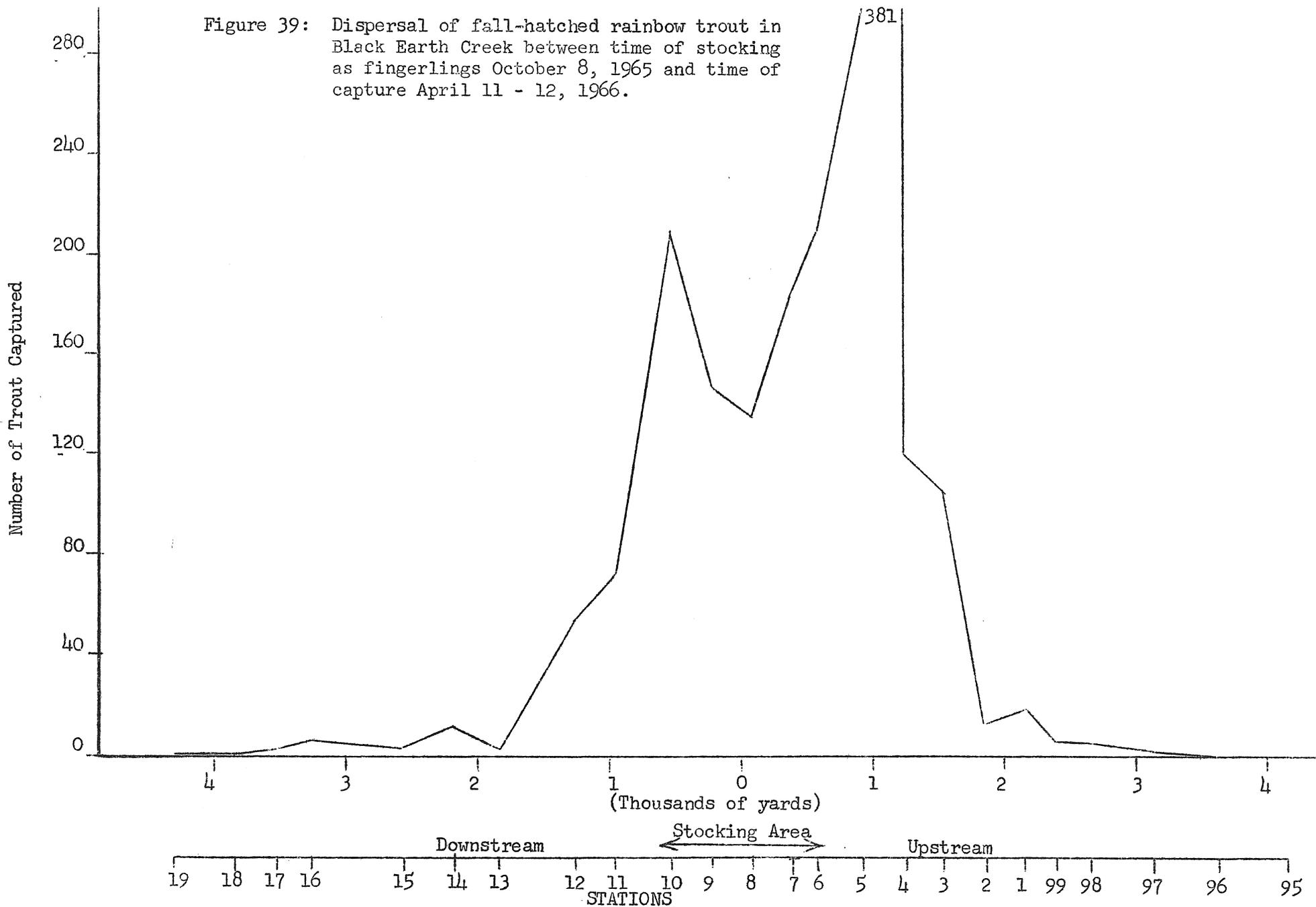


Figure 38: Dispersal of spring-hatched strain and Donaldson strain rainbow trout in Mt. Vernon Creek between time of stocking as fingerlings October 1, 1964 and time of capture April 19 - 21, 1965.

Figure 39: Dispersal of fall-hatched rainbow trout in Black Earth Creek between time of stocking as fingerlings October 8, 1965 and time of capture April 11 - 12, 1966.



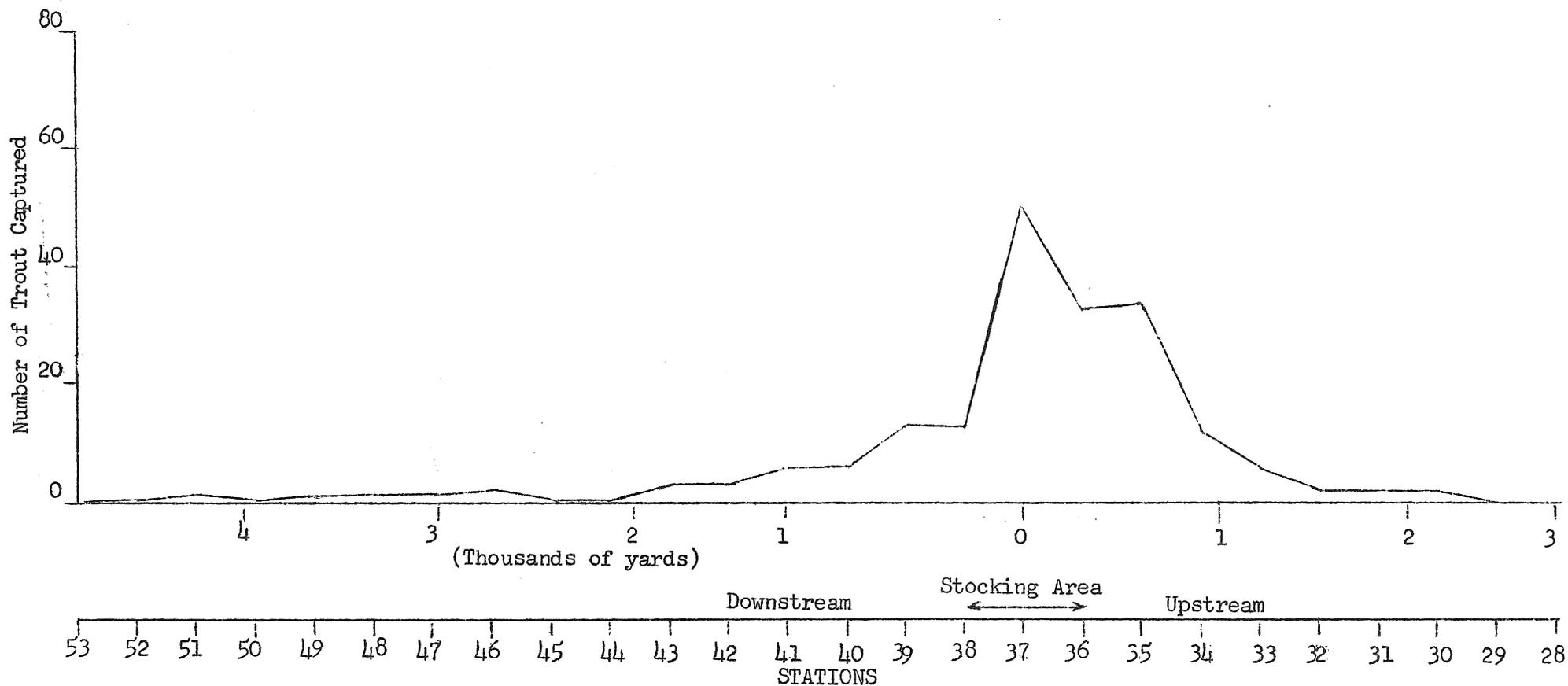
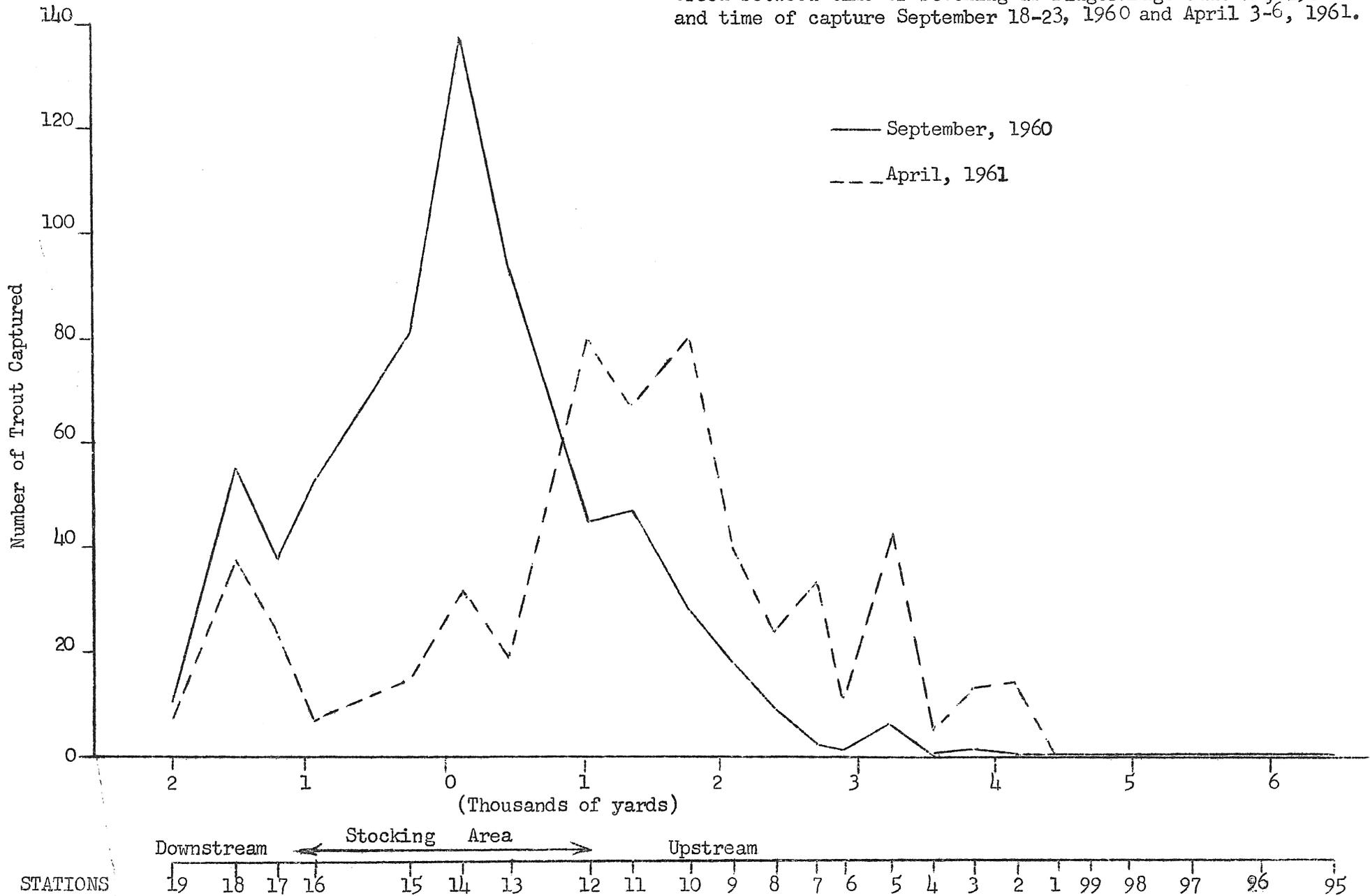


Figure 40: Dispersal of fall-hatched rainbow trout in Big Roche-a-Cri Creek between time of stocking as fingerlings June 16, 1959 and time of capture September 21 - 29, 1959.

Figure 41: Dispersal of fall-hatched rainbow trout in Black Earth Creek between time of stocking as fingerlings June 14, 1960 and time of capture September 18-23, 1960 and April 3-6, 1961.



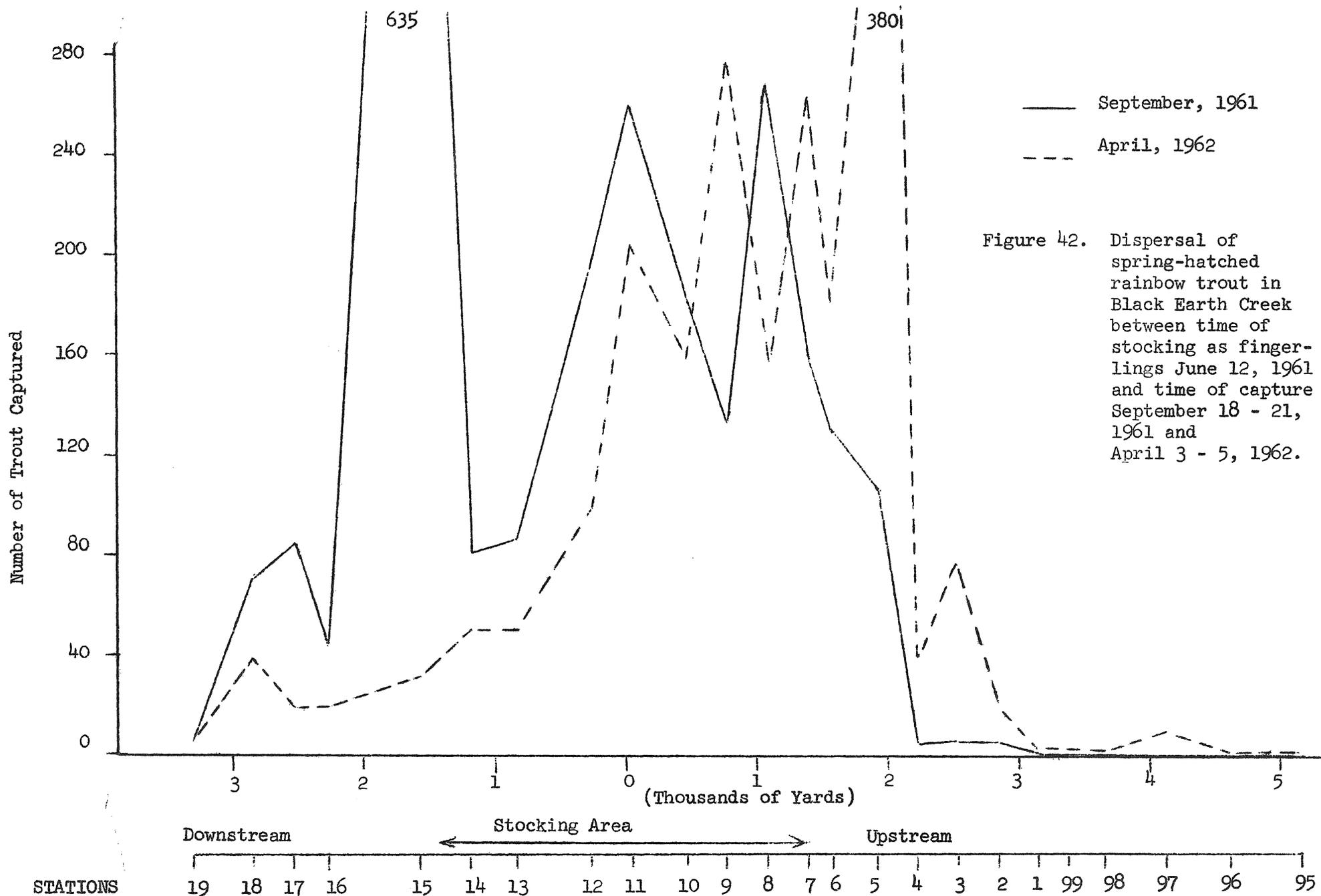


Figure 42. Dispersal of spring-hatched rainbow trout in Black Earth Creek between time of stocking as fingerlings June 12, 1961 and time of capture September 18 - 21, 1961 and April 3 - 5, 1962.

