# SOUTH PACIFIC COMMISSION 

## WORKSHOP ON PACIFICINSHORE FISHERY RESOURCES

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# Fiji's fisheries dota collection and information system 

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## Intreduction

1. The Fijl Islands, Iying approximately between Lot. $16^{\circ} \mathrm{S}$ and $21^{\circ} \mathrm{S}$, and Long. $177^{\circ} \mathrm{E}$ and $178^{\circ} \mathrm{W}$. comprise about 300 islands and rumerous islets and reefs, covering en occenic aree of about $260,000 \mathrm{~km} 2$. The group has a relotivaly lerge continentol shelf of dbout $15,000 \mathrm{~km} 2$ in total, mostly in the form, of shallow waters in the west and north of the main isiands, viti Levu and Venua Levu.
2. Per capito apparent consumption of fisheries protucts, including domestic production and imports, is around 47 kg for the 770,000 people of the couniry (Fisteries Division proliminery estimote).
3. The fistheries sector is relatively diverse with industrial, commercial/ertisenal and subsistence components. One of the major roles of the Fisteries Division of the Ministery of Primary Industries is to collect, analyse and disseminate production dota from the fisheries sector for administrative, planning, policy formulation, development appraisal and user information purposes. To this end, a Market Survey group was established within the Resource Assessment and Development (RA\&D) section of the Division in 1977.
4. As it neme suguests, the RA\&D section also thes the responsibility for scientific stock assesment of exploited populations and provision of management advice as required.
5. This paper describes the present data collection system developed by the Fisheries Division, its autput, and relations with other Government departments and user groups.

## The present system

6. The Market Survey group, or Inshore Respurce Management brench as it hes evolved into, has the services of six staff viritually full time, three in Cantral Division (Suva), two in Western Division (Lautoma) and one in the Northern Division (Labosa). Their efforts are primerity directed to surveys of commercial/artisenal sector merket outlets - municipal merkets, rood-side sales, retall outlets and tha Not ional Marketing Authority. No catch data are currently collected directly from commercial fishing vessels (other then the industrial and export fleet), har are any dete on vessel aperational economics or economic indicators collected.
7. As the Fisheries Division aconinisters the licensing of fisthermen and vessels, and exports of mer ine produce, deta are obtained from these sourcas, as well.
8. The industrial tuns fleet (Ika Corporation) provides detailed caich and effort tota on forms supplited by the Division. Lending dota are supplied by the Pacific Fishing company (PAFCO), where most of the industrial catch is canned for export.
9. The subsistence fishery was surveyed in 1978/79, providing an estimated total cotch of $13,800 \mathrm{mt}$. This is arbitrarily upgraded annually, but with little confidence, and the estimate requires considereble refinement.
10. Data is obtained from other Oovernment depertments (Bureou of Census and Stotistics, Department of Customs and Excise). The ten-yeer Agricultural Census, which was to genersie information on the fisheries sector for the first time, wes due this yeer (1988) but has been postponed for obvious ressons, to ensure deta gethered is truly representetive.
11. Data relevent to stock essessment heve been collected on an ad hoc besis, as required.
12. The following sections provide detalls of the present system, deta processing arrangements and dissemination of information collected.

## Market Statistics (Commercial/Artisenal Catch)

13. The Fistheries Divistion thes made considerable offorts to develop its market intelligence system, and the greater part of the Division's deta gethering effort is directed towards this setivity. Fiji's fish merketing systems are complex, perticularly when compared to the overall size of the sector and can be classified es follows:

- Municipel markets
- emedside Soles
- Sales to Retail and Wholesole outlots
- Notional Marketing Authority

14. Most of the non-fish products are sold through the municipol merkets, while finfist follow a variaty of channels. Middiemen are buying a significant and increesing shere of the catch for both local sole and shipment to other urban centres.

## Municipol markets

15. There are eleven municipal markets, all of which except Labose are on Viti Levu, te. Contral Division -4, Western Division-6 (Figura !).

16. Most fist sold in the municipal merkets continus to be sold by the fistermen. However, middlemen ars toking on increasing proportion of the catch and are dominent in same markets, particularly in Western Division.
17. Suva is the major consumption centre of fist in Fili, With a totail population of almost 80,000 as at mid 1985 (incluting Nauscri and Lemi) out of a nothonal total papulation of over 700,000 . The fish market in Suva formerly hendled as much fish as the other mejor markets, but the high level of market charges ( 30 to 50 cants per kilogram) thes coused fishermen to withhold thair fish end most of the locel marketed catch is now sold from punts in the neighbouring creek or by roedside vendors. Market fees in the other municipal merkets are lower and range from 5 cents at Taviso to 14-15 cents in most of the lerger Western Division, merkets.
18. Sund and the Western and Northern Division fist markets open dolly apart from Sunday, while the remaining Central Division merkets only generally recaive fish on Soturdeys. Other products such as kai (frest woter mussel), merine molluses, echinodarms and seeweed are sold throught the generol produces section of the markets.
19. The markets are surveyed by Fisteries Division staff, usually on at least six deys eech month for the six dey markets, one of each dey except Sundeys. All fish is also recorded by the market master (waight only, not species) as it enters the market and this provides a ready check on tolal quantity. The Fisheries Officer responsible for recording the market throughput on perticular sampling doy arrives of the market of about the opening time of 0700 and remains until most fist hove arrived, usually by 1400 . He notes the waight of fist by species or species group brountt in by each fishermen or middlemen and the price which he feels to be representetive for that dey's seles.
20. Orce the six (or more) dey's deta have been recorded, any deplicoted deys are avercyed and total quantity for the month estimoted by multiplying the six doy total by four and adting the outstanding days. For example, if a 30 -dey month commences on a Mondey, it would be necsssery to add the quantity reported for Mondey and Tuesdey, as there are five of both these doys in the month.
21. A similar market recording system is employed at three of the regular selling locations outside the municipal markets. In central Division, much of the fish sold in Suva is now sold from boots in Nobukalou creak afjacent to the market. This selling location and another of the major roedside stalls of Leqere, midway botween Suve and Neusorl is currently being surveyed on the same besis as the municipal markets. A reasonably regular survey is also undertaken at Nomeke, on the outskir's of Nati which has a throughput of dbout 10 tonnes per month.
22. Followinge review of this system in 1986, the sempling strategy was revised, in view of the faet that half of the weak's output in most markets is received on a single day (Soturdey) and thet the four largest markets cocount for $80 \%$ of market fish. Sampling efforts are now concentrated on Selurdeys in the major markets, allowing more effort to be directed to surveys of roadside sales and retail outlets. This also reflects the deciining percentage of total cotch passing through municipal markels anmuilly. Markel masters, who have historically collected information on sales volume, have also been issuad with simple record books in which the type of fish can also be recordecth (Appendix I).

## Root-side Solas

23. These eccounted for epproximedely 308 of cornmercial fish and non-fish seles in 1986 (Aron, 1987). In centroi Division the proctice of roedsite selling in condred in Suva, though it is ressonebly common to a distence of sbout 80 kilometres from the capita.
24. The out iets are surveyed ance or twice per month, using markel survey dote sheets, with most surveys on Sundeys. The surveyers usually make about three rounds of the stalls. Each of the seven or so selling areas is recordan seperately, though in the final enolysis onity eagregete deta is prepered.
25. In Western Division, the roodside outlets are generally conmentroted around urben centres, including Lautoka, Nemaka (Nadi), Tabereu, Madalevu, Namado, Lomewai and Cuvu. Namaka has become a major selling point in recent momths and now has a throughout as high as Nedi itself. Outlets are surveyed as transport permits, but given the 200 km of road to to covered, this is a major constraint.

## Soles thrauth Retoll outiets

26. The third component of morket is the quarterly collection of data on soles by retall out lets. These are intended to be undartaken each April, tuly, October end vanuary when deta relating to the previous three months are collected.
27. The main classes of retall outhet ere: hotels/restaurents, butchers, stops and shops/supermerkets. The surveys ere underteken through interviews with the menegers of the outlats. Of the various classes, only a few of the butchers maintain records of their purcheses and the interviewer notes that quantities purchesed from these records. For the other classes, the dete are besed on the respondent's recall of his purchases and eccuracy consequently suffers, probably being weighted towerds his purchases during the immediately proceating period. Since the butchers account for over 80 per cent of total outlet seles, this is not serious. However, out staff consider a monthly or bimenthly survey merits introduction to reduce recell problems, and receipt books were recently supplied to retall outtets on a trial besis (Appendix 1).

## National Markoting Authority

28. NMA is a semi-government orgenisation which purchases fish from the fisharmen in villeges and urban centres in Viti Levu, Vanua Levu, Taveuni and other arees. A recent development has been the installation of ice boxes in some villages, where ice is delivered and fish purchased, normally every two doys. Some fish are sold locally, but the majority are forwarded to Lami on refrigersted trucks via the roll-on, roll-off ferries. In Lami, fish is sold frest, frozen, or may be procossed for local sole or export.
29. Deta are collected by Fisheries Division within their "Other outtets" survey on a quarterly basis from the NHA besses Le Lemi, Lautoka and Labess. Only retail deta are recorded as other soles would risk double counting the other surveys. Price dota are not always reported, but represent a potentially useful check on the market price anolysis.

## Page 6

## Industrial Tuma Production

## Iunas cestohas

30. The six pole and line vessels maintain duplicete logbooks, which are intended to be forwarded to Reseerch Unit every month. Some vessels require reminding to complote end/or return their shoots and one vessel (privade) has consistentiy refused to supply dolta. The dote recorded on the sheets are es follows (Appendix 2) :
```
Vessel cheracteristics (nama/light wattoge/number of crew/lonnage)
Dede
Bait areo code (sometimes completed by market reseerch stefis)
Baiting position
catch per houls
Total catch
species composition (%)
Fisting noon temp.
Areo lished
School slghted/Fish
calch per species(mumber/average woight/ total welght)
```

31. The deta are entered into a dota base and are anolysed through a basic dota sorting programme. In the same way, bait catches by volume, species grouping end aree are evailable.
32. The foreign longliners had ell left fijien waters by eorly 1986 while the two purse seiners departed in mid-1985. Until that time, the Division was receiving monthly SPC designed logstheets, recording similer information to that for the tund pole boots (except for the boiting informetion). Particular problems were previousty experienced with some of the Taiwenese vessels, reportedly due to the inability of some skippers to reed and write in English.
33. The data are forwarded irregulerly to SPC for computer procossing Summeries of catch and effort deto are returned promplly, ofien within two weeks.

## Iuna lendinas

34. Since the tune are not weighed until they are landed, the waights as recorded in the logbooks are not always accurate. Moreover the fishing menths do not always correspond to colender months. On lending of PAFCO, each vessel's fist ere welghed and the deta recorded. Monthly summeries are prepered and forwerded to the Division. Catch deta are trenseribed onto analysis sheets and are totalled by spreatsheots ad the ent of the.year. Thase data are used to check the scourscy of the catch dete and are published in acregoted form in the Annual Report.
ouber edeta

## Imports/Expocts

35. Data on exports are collected at two levels. All exports of merine produce are required in theory to be registered with the Fisheries Division. In prectice, only athout 70 \& of exports by volume are registered, and the Custorms Department is therefore the moin long term source of export dete, end the only source of import dote. These custom entries are now mete on line, considerably speoding up the enalysis.
36. The Diviston however, obtains detailed export deto (numbers, species and collection aree) on two resourca categories - equarium fish and ornemental corals - by virtue of a Cabinet decision relating to the harvest of sedentery resources. The growing exports of deepwater snepper hove also been sampled in greoter dotail.
37. Through the copperstion of the Bureau of Statistics, the previous import clessificotion, which grouped 908 of the valume in only 2 of the 16 categories used, hes been revised to provide greater details on imports.

## Licence dode

38. Recognising the annual licence epplication process is the one time of the yeer when all commercial fishermen ere in contect with the Division, efforts were made in 1987 to collect, by interview, a wider range of information from fistermen as a sector inventary (vassels, geer and fishermen). Analyses of these dela are proceeting.

## Catch effort (iontoosk) dota

39. Apart from the pole and line fleet, no commercial vessels have supplied atch and effori data. An unsuccessful attempt was made in 1982 to issue dupilicate loghooks, in English, and Fijian, to commercial rishermen. Follow-up was poor, objectives were mixed, no incentives were provided and the scheme failed.
40. More recently, in response to the need for date from the developing deep-water snapper fishery, logbooks were issued to the larger vessels which supply the bulk of the catch (see relevent paper).

## Economic dolo and roparent comsumotion

41. As noted earlier, no dota on vessel operating economics, other then that generated by ika corporation and private vessel owners, are collected, nor are aconomic indicators. Apparent comsumption is similarly not colculated. In the absence of an economic capability within the Division, these will continue to be low priority.

## Subsistence sector surveys

42. While the subsistence catch looms $\mathbf{s 0}$ large in total fisheries production, its accurate survey is an importent but difficult and unproductive (in the direct development sense) task. It has been recommended (Anon, 1986b) that o two-component survey be undertaken, comprising a 108 village interview survey of coestal villages ( 208 of housenolds) followed later by a weighing survey of $25 \%$ of the previous stmple (once in summer, once in winter).

## Censusdata

43. The national census provides few deta of relevence to the fischer ies sector. However, the 10-yeer Agricultural Census, scheduted for 1988 but postponed temporarily, has agreed to include a fisteries section for the first time. This sthould provide a range of useful deta on population involvement, geer and vessel catalogue, participation in the sector, lavels of effort by aree and dota on tenure patterns.

## Slock essessment drte

44. Few data have been collected for long-term stock assessment purposes, apart from pole-and-line and bait fisti catches by the industritilistery (see, for eg, Lewis et al., 1983 and BP 14, this workstop). In conjunction with merket survey deta, length-irequency dote on lethrinid species were collected od municipal markets over a 12 months period as pert of a preiliminary essessment of levels of explotitation of this the most valueble fish family in the catch (Dalzell et 81, MS).
45. More recently, lendings of deep-woter sneppers heve been intensively sampled, as representative of virgin stock, for derivation of yield perameters ( $M / K, L \infty$ otc). Notural populations of gient clams hove been sempled in situ as pert of an assessment of Fiji's stocks.

## Date malysis

46. The Division operates a relativaly well developed system of microcomputer thete analysis. The heed officor in Lemi processes most deta (much market deta is now supplied monthly on disk by outstations) using an HP9837 (pole and line catch, grephics, clam survey deta), an IBM AT (Market dote, outhat survey deta, grephics, others) and a Commodore 20 (market doto, licensing databese). In atitition, subsidiary offices (Lartoks, Laboss, Accounts, Information) operate IBM XT's. It is eventually plenned to link all systems through the Government's EDP Vax system, via a dadicated phone link.

## Informotion dissminution

47. The main external veticie for the dissemination of statistical data is the Division's Annual Report. This is now issued in timely fastion ie. by March-April of the following yeer, and in summery formet which mekes mast important date reedily eccossible. Appendix 3, for exemple, shows the six yeer summery of bocel fisterios praduction from the 1986 Annual Report.
48. Internaliy, a quarterly stotistical bulletin is produced for circulation. This not only essists the preperation of Annual end briefing reports, but complies with the requirement of the central Plenning office to collade and provide a quarterly sector production summery.
49. In the pest, menthly bulletins on tune catch were provided for industry (ika Boord of Directors) but their usefulness was hampered by the delay in returning cotch forms by some vessols.
50. Data are supplied on request to other agencles both within Fill (eg. Fijl Development Bank, private sector enquiries) and without (FAO Yeerbook of Fisheries Statistics, Regional Data Base, Regional Register of Vessels).
51. It has been suggested that mare should be done to disseminate production date particularly market data (volumes, prices) on a timely basis (Anon, 1986b), preferably by radio broedcosts.

## Conclusions

52. The system doveloped by the Division is moder ately sophisticated by reptonal stenderds and in general is working well in support of development planning The recent review of the system has allowed the system to be refined to some degree, through the identification of weeknesses.
53. The major defictency continues to be the absence of time series catch/effort deta in most fisheries. This challenge is gradually being addressed.
54. The system is demanding of menpower, but genorates meesurable resuits out of proportion to this commitment ( 6 full time stafi). Lack of transport and staff training are stili major constraints, but the existing system, which is continuing to evolve, has served the Fisterles Division and Fill well in its first 10 yeers.

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## Appendix I

## Sheet from record book issued to markek mesters



Sheet from recoipt book issued to retall outlets．

MINISTRY OF PRIMARY INDUSTRIES FISHERIES OIVISION，P．O．BOX 358，SUUA．No 002001

シニニニニニニニニニニニ DRTE
SUPPLIER
ORGANIZATION CODE
RODRESS


## DAILY CATCH RECORD - POLE \& LINE VESSELS : FIJI.




No. of Crew: $\qquad$


## Appendix 3

Summary of local fish production, Fiji, 1981-1986.

| CLASSIFICATION | 1981 |  | 1982 |  | 1983 |  | 1984 |  | 1985 |  | 1986 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Hyt | Value | Wgt | Value | Hgt | Value | Hgt | Value | Het | Value | Hgt | Value |
|  |  | \$1000 |  | \$1000 |  | \$1000 |  | \$1000 |  | \$1000 |  | \$1000 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| FISH PRODUCTS |  |  |  |  |  |  |  |  |  |  |  |  |
| Munitipal Market | 1132.91 | 2022.22 | 973.71 | 1832.67 | 840.60 | 1575.80 | 925.30 | 1625.20 | 980.93 | 1638.20 | 963.11 | 1916.59 |
| Wha | 192.00 | 234.67 | 134.13 | 660.78 | 290.60 | 365.56 | 276.00 | 277.13 | 379.33 | 656.73 | 240.53 | 478.65 |
| Other Outlets | 1305.16 | 3251.48 | 1755.76 | 3265.71 | 2360.60 | 4484.30 | 2728.00 | 5353.74 | 2691.04 | 5727.20 | 3113.77 | 6196.40 |
| Saoked Fish | 9.85 | 36.85 | 21.50 | 64.50 | 35.82 | 123.13 | 21.30 | 43.99 | 27,30 | 61.00 | 16.33 | 35.93 |
| Salted Fish | 9.65 | 41.74 | 26.70 | 80.10 | 33.80 | 141.73 | 9.70 | 38.63 | 5.10 | 20.50 | 4.45 | 21.49 |
| Sub total | 2649.57 | 5586.96 | 2913.80 | 5903.76 | 3561.42 | 6690.52 | 3960.30 | 7338.69 | 4083.70 | 8103.83 | 4338.19 | 8649.07 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOH-FISH PRODUCTS |  |  |  |  |  |  |  |  |  |  |  |  |
| Municipal Market | 1093.51 | 719.04 | 1443.10 | 2879.10 | 1450.30 | 880.96 | 1547.16 | 766.39 | 1175.70 | 643.83 | 1279.96 | 930.12 |
| NHA $\&$ Other Dutlets | 39.30 | 144.95 | 57.10 | 113.91 | 502.90 | 782.20 | 233.40 | 910.37 | 423.38 | 359.40 | 544.55 | 856.11 |
| Sub total | 1132.81 | 863.99 | 1500.20 | 2993.01 | 1953.20 | 1663.16 | 1780.56 | 1676.76 | 1599.08 | 1003.23 | 1824.51 | 1786.23 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| RURAL FISHJMg SCHEME | 79.04 | 104.99 | 99.40 | 133.32 | 143.80 | 192.03 | 121.76 | 169.00 | 180.70 | 256.94 | 210.00 | 380.13 |
| Total | 3861.42 | 6555.94 | 4513.40 | 9030.09 | 5658,42 | 8545.71 | 5862.62 | 9184.45 | 5863.48 | 9364.00 | 6372.70 | 380.13 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Subsistence | 14200.00 |  | 14400.00 |  | 14600,00 |  | 14800.00 |  | 15000.00 |  | 15200.00 |  |
| Cankery production |  |  |  |  |  |  |  |  |  |  |  |  |
| Canned Fish (ctn) 7 | 709622.00 |  | 635461.00 |  | 551321.00 |  | 592484.00 |  | 436315.00 |  | 602281.00 |  |
| Fish Meal | 640.15 | 279.33 | 717.50 | 329.67 | 741.40 | 312.80 | 682.18 |  | 652.18 | 324.70 | 771.00 | 394.45 |
| INDUSTRIAL FISHERIES |  |  |  |  |  |  |  |  |  |  |  |  |
| Pole \& Line | 5828.20 | 4696.60 | 4664.30 | 3830.00 | 5468.90 | 3426.20 | 4572.80 | 3900.00 | 3252.00 | 2325.10 | 3119.34 | 2220.00 |
| Purse Seine | 722.25 | 644.68 | 1006.70 | 812.60 | 1006.00 | 894.20 | 577.26 | 436.80 | 693.00 | 497.10 |  |  |
| Long Line | 3219.29 | 5073.00 | 2139.50 | 3371.00 | 1384.22 | 5581.80 | 1832.90 | 2200.00 | 2105.60 | 3751.50 | 1237.20 | 1730.00 |
| Other (Iaport) |  |  |  |  | 368:00 | 381.83 | 1987.30 | 1594.30 | 2374.20 | 1620.50 | 5924,00 |  |
| Sub Total | 9769.74 | 10414.28 | 7810.50 | 8013.60 | 8227.12 | 10284.03 | 8970.26 | 8131.10 | 8424.80 | 8194.20 | 10280. 54 | 3950.00 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| BAIT | 110.59 |  | 144.57 |  | 114.56 |  | 95.18 |  | 57.20 |  | 59.70 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| EXPORT |  |  |  |  |  |  |  |  |  |  |  |  |
| Shark fin | 41.60 | 207.72 | 40.50 | 108.80 | 7.70 | 61.62 | 8.00 | 64.00 | 10.82 | 108.20 | 8.32 | 84.36 |
| Trochus | 182.70 | 109.64 | 219.10 | 328.65 | 334.10 | 576.90 | 340.10 | 646.19 | 274:00 | 534,30 | 233.66 | 738.99 |
| MOP | 70.05 | 26.42 | 17.10 | 51.10 | 22.30 | 80.28 | 23.60 | 84.96 | 16.10 | 56.00 | 12.34 | 45.12 |
| Beche-de-Her | 15.84 | 109.08 | 34.60 | 346.03 | 32.90 | 394.80 | 53.70 | 451.35 | 66.20 | 660.00 | 229.38 | 886.67 |
| Frozen Crab | 4.10 | 20.41 | 4.26 | 34.08 | 1.50 | 12.00 | - | - | 0.04 | 0.18 |  |  |
| Frozen fish-Private -PAFCO | - 5.40 | 24.41 | 7.50 | 37.50 | 3.10 | 15.50 | 4.60 | 46.00 | 26.60 | 133.00 | 88.77 | 309.66 |
|  | 1673.30 | 2810.11 | 543.70 | 773.90 | 492.50 | 526.70 | 633.80 | 674.90 | 1823.00 | 3300.00 | 186.00 | 180.68 |
| Dried Seameed |  |  |  |  |  |  |  |  |  |  | 173.41 | 135.29 |
| Snoked Fish |  |  |  |  |  |  |  |  |  |  | 0.04 | 0.11 |
| Others |  |  |  |  |  |  |  |  |  |  | 16.35 | 380.59 |


| Sub total 1992.99 | 3307.79 | 866.76 | 1680.06 | 894.10 | 1667.80 | 1063.80 | 1967.40 | 2216.77 | 4791.68 | 948.27 | 2761.47 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Aquariun Fish (no) |  |  |  |  |  | 12866.00 | 2400.00 | 59404.00 | 96.48 | 71840.00 | 103.33 |
| Canned Fish (ctn) 662206.00 | 15468.10 | 574129.00 | 11310.00 | 771470.00 | 16416.00 | 589543.00 | 16088.50 | 450198.00 | 12497.10 | 615994.00 | 19500.00 |
| Donestic canned(ctn) 6662.00 | 88.25 | 7691.00 | 108.96 | 7034.00 | 76.38 | 8678.00 | 116.82 | 7400.00 | 108.86 | 8192.00 | 162.98 |

