

08/01/2024

Season 1 incentives incident - Incorrect claimable balance

Summary:

The contract worked correctly but the off-chain scripts miscalculated some of the claimable balances even though a sample of rewards was verified before pushing all the claims on-chain and the total sum seemed to be in the expected range.

```
99 100      }
100 -      foundRecord.liquid_amount += balance.liquid_amount;
101 -      foundRecord.native_amount += balance.native_amount;
101 +      foundRecord.liquid_amount = (parseFloat(foundRecord.liquid_amount) + parseFloat(balance.liquid_amount)).toString();
102 +      foundRecord.native_amount = (parseFloat(foundRecord.native_amount) + parseFloat(balance.native_amount)).toString();
102 103      mappedUniqueBalances.set(mapKey, foundRecord);
```

Timeline:

- **January 08, 2024 18:27 UTC:** User reported incorrect balance is claimable
- **19:43:** Engineering team has verified that some of the claimable balances do not match the rewards calculated for some of the stakers
- **20:00:** Incentive contract has been stopped:
<https://solscan.io/tx/2cLws5WQrgc7rWZ8EaDzvBWtP2d3oKJSyUb77ptcLNZc2VrVeHxfKMoVohqYtUVdzyrNwmnDo86Un7ufDPvJ6XUt>
- **22:30:** A bug in the calculation has been discovered
- **23:30:** Reward amounts have been re-calculated and verified by an independent method
- **23:54:** Corrected data has been calculated using a fixed script and cross-checked with the results from the independent method
- **00:19:** First unclaimed record fixed on-chain:
<https://solscan.io/tx/R67n3vvSsLecPwFBqtjeJ3PK9nPmGMtFF9JNYKobnAe29HSoyWkN63BzS9wPUBqsoH7A6ukRhH1kmFZnfR4fx69>
- **3:14:** All records for unclaimed balances fixed on-chain
- **3:26:** Unclaimed records on-chain double-checked
- **3:36:** Contract unpaused:
<https://solscan.io/tx/4npwYmFptJo8pvYPMSK8486VAGXJdUeezo3EsLL6XNgPxvdv42CsStFRQZxTWCTgny7wLKL4Y3AC691u8iAdPBef>
- **3:37:** Claim re-enabled on Marinade web

Impact:

- Only some staker rewards are impacted, referrer rewards are not impacted
- Total claims before pausing the contract amounted to 5 989 785 MNDE while the claims should have been only 5 553 060 (Extra 436 725 MNDE has been claimed)
- Total claim amount put on-chain in claimable record: 12 005 055 MNDE
- Total claim amount that should have been put on chain: 10 800 540 MNDE
- Total extra amount on-chain has been: 1 204 515 MNDE
- While the contract is paused, users cannot claim rewards
- Claimed extra balances by pubkey (difference > 100 MNDE):

Pubkey	Extra balance
EMVHQWNYCET3sSKFPJnEpbrSavA1agU5Z2d8hkqcCv1a	298,820.101070
CWVFYWRJeWBpWFdoQKU7u5rXtdtx4bxH3K2sbgwVaeVD	69,898.248223
9UU2Z8BzzstdkindwnzwowSSMK9APNeYM6QUHqA3vhY2	69,710.034006
2XwLu1DDYkE5d1B1yFTWdsG1Mq6kmv1kmzbH6JU5nvev	748.775664
7sSfcYGcPFN2x45iqpEhPUDUjRYK51JZpvJF7SEPLvqU	694.365576
5TLxjswUX3wLTnqAMWAeGZptveudBV8HrE545Jm5u1Da	447.012413
4stbBntb5EVmMFJgQ6ojX9AkyVc1M8fj3VHfnUMYmtf7	270.445199
EeebP7e6BBGwkrC7sd4v2gq1k8wCqs717xiGWXWHAJz	204.381250
HGashWdDfztsifWtpC7Yz9Uj9QbVPiP2b25FBBM6hzYd	161.470325
F6jXSVDecwYQ9RMNDaDKtAyAa4DhVWV4nLZB4tvuKN4F	129.982037
2NhfAjHzI8Ks4QDNUGXeJgBCSbzqau4GsKgzvG5c7nND	119.916419
7G1enbxCvj3foL2BLiWRfppmZJDE1yB18T3jYCeZsNC1	114.674319

A complete list of wallets is available in [Marinade's changelog](#). In total, 50 wallets were affected for a total of 441,686 MNDE.

- Underclaimed balances by pubkey (difference > 10 MNDE)

Pubkey	Unclaimed balance
5ffvQo2MnNmF2iaDJ3ax1nYQW6izGZNBMs5xcAoFxJoZ	-1353.975555
E7rxAmmgDTkfqAGHwgHgtP4HYB3hCLP1joBbsQp82LCs	-708.007324

3KNZ9i1dLNNqpBTKEkTgUQs6TNCd3bzuy6HwfoXACaRs	-654.157316
QM3ACFu3VD9N6z6dmBseezxrNRP1T4MruGhpJX8B3nC	-524.006226
71hhezkhQ2dhmPySsHVCCkLggfWzPFEBdfEjbn4NCXMG	-107.384657
HZiafPv64janH3yd1KQ6mu8j8DUFMXTpRZwzuvLxWqF2	-88.403410
6vsrhfNWmfVg15KrvTMQC5eXXcAUdjzhXEwsAbd3JzYQ	-76.083624
CN3oujzF4KQ8pUyLQCwVigXoU7iyCFs9KuzZTpm6jDyM	-75.889200
7seftVEe5h9q6iu4CGZtrQ7P76bfQLHLitg2po9c8fno	-49.069830
2FwV6duQGoy2ABw4MXEgZS7q3SqinmKbJuSLB8ii97qu	-44.509109
J6DV46TYWk359ym6Uks5FT7ehfnWhcjVrHYowCbYLfXR	-43.830309
DUHvDxvzPrP5WzGyLqKz6zHPf1o8QbFthCGmqYUhcOyQ	-41.905008
AAxUabt7kfbyLTgyS4wnc5zR9cs5nMXkdp9sXLJaY6i4	-29.087598
6mDCFCkBrDudj4SmF9uTrjgp5BtBa86uvjXVbLua8VLR	-28.303649
4XcG5C5XqNzM9rJKG9ApzXpQJmTYLg5SQJ3DvZQvLKsc	-21.323699
HDYLL2nVzibcdDJ769SGD2FDZRdrzb3mo1B3BkSFdJAS	-20.660285
7vy48rqcRCdHdcnqBAbXkmnnW7XTteKVHed55uurzcC2	-18.413061
8UZd3HdNDRM5voyD5DMYq95SvoWCE26kyPsVoFfnNWdu	-17.781840
Gjve83gTtUyHqnbNChYcJxFyutAVbqvFFF7qv8YAZEhp	-16.290909
AjXNcXPkD3xsLYJdgbfVPH93wvzZMkWTFGcR1Wc1jriU	-14.498832
BYrCK3Ny4i8NdawSZgto7DKBoUtH9LpKacRF1f6Rya47	-14.415754
EJVZYokYmwvtvtokKJuszsBJRQ4tb2NR475Fc7XH2g1g2	-14.248933
H2xLhrjaJCFKKiz8YvGwAWczPKZWfzLv1DRW9Nf525Lr	-14.220914
5WMLMvi3otxUCw6EndpSLZYzpcBMgGQoRA9ndT3DKmmQ	-14.147621
F3qrbwQm2GUbQxTwwRzvqxmQxGjUi8WE9x3obJqkXhG3	-12.832723
ASNsejndZQmh3p5taTGEQajzD9Bed9Skx68ETQC4mucC	-12.281076
8UzNaYrng6HMrv3yn9biqFtQbQnCnypQa7gNyJhFJHtb	-12.230842
Fmnf3S9QYxinwNVEXfXuDDQVYCZCHgA4tuyjuGqf2UfC	-11.372302
Bufs7AufubH1xUSHkLxwvi8XYjykZ8s2W5n74A82kJE5	-11.322741
PwNFq3wPnncPvnxUwdjuS5JzboLfvhmREncADN6775j	-11.158092
264LuNac8jLqQ1N86xFjxB4yNzsbvrTovzjB4X2RJ6wc	-10.821755
EZoNMtoJmUB2kLKeTmeubKch6PAaH9ccx6GdoKeGNfmR	-10.543921
7GmjpH2hpj3A5d6f1LTjXUAY8MR8FDTvZcPY79RDRDhq	-10.528779

A complete list of wallets is available in [Marinade's changelog](#). In total, 6235 wallets were affected for a total of 4,962 MNDE.

Takeaways:

- Monitor txs in new contracts and verify automatically if all seems ok.
 - E.g. scrape all txs and verify the on-chain claims match the off-chain API
- Have the airdrops/significant amounts recalculated independently by another team member using different method